

1895

1936

JUST AMONG OURSELVES

"No Used-Car Problem"

IT was refreshing to talk to Paul Hoffman of Studebaker about used cars, after a couple of weeks of immersion in many phases of the subject, most of them disheartening. To Mr. Hoffman the used car does not connote a "problem". The troubles connected with it, he believes, arise from the fact that it is not sufficiently appreciated by the automobile industry that there is really no such thing as a new car dealer. Dealers who make money are essentially used car merchants and few dealers begin to make money before they realize this.

The soundest basis for a dealership, to Mr. Hoffman's mind, is to pick a man who has had five or six years of successful experience in operating with used cars alone. Such a man, if he has conducted his business ethically and profitably, is a real merchant, and is likely to succeed with new cars because they will appeal to him as premium business.

The plethora of used cars, where it occurs, is a metropolitan condition, says Studebaker's president. Part of the difficulty, he says, comes from competition among dealers of a single make, of which there are usually too many in a large city for some of them to make money.

If such a condition existed in the grocery trade, Mr. Hoffman points out, it isn't likely that you would find grocers who were well stocked with flour, buying more flour at an unprofitable price for the sake of reselling

it at a loss. There are no panaceas for selling off used car stocks. The only sound solution begins with factory choice of dealer outlets.

Junking plans? If a dealer doesn't know what cars he should junk for his own advantage, there is little to be gained by his factory setting up a "policing" plan—for which the dealer pays in the end.

These views, from the head of a company which is showing very sound progress under current conditions, are offered as being among the most stimulating encountered in a swing around the major automobile plants during the last three weeks.

Beauty in Buttons

IN a few weeks now, General Motors will be opening near Chicago its new plant for the production of electromotivated rail equipment. It will be the first American plant for the manufacture of Diesel locomotives in quantities to reach an attractive price, and will incorporate so far as possible the production-line philosophy used in the manufacture of motor vehicles.

In talking about the new plant with some of GM's people, we learned with interest that the art and color section of the General Motors Corp. has been called

on for some design jobs which include tableware and flunkey's buttons for streamlined trains. This seems far afield from the automotive industry. But it indicates that the industry is being recognized more and more on the "outside" as the place to come for functional applications of modernized transportation—down to the last knife and fork involved.

"Sudden Death"

FROM the standpoint of safe driving, little will be gained, we believe, by the dramatization of " . . . and Sudden Death," which is now appearing on the air. Mr. Furnas's pamphlet story achieved the ultimate in horror and effect through the printed word. Who of its readers, for example, does not get an internal twinge when he reads subsequently in the daily paper that So-and-so received a broken pelvis as a result of an automobile accident.

The radio art has raised sound effects to the point where they can stimulate the imagination more rapidly and effectively than the printed word. When translated into sound effects, " . . . and Sudden Death" becomes almost unbearable for the average person. What is unbearable on the radio we turn off.

The shock approach in safety education probably has its proper place, but it can be carried to the point where it loses its effectiveness entirely.

—H. H.

As We Go to Press

As we go to press, we are informed that a restraining order against Frank H. Bowen, regional director of the National Labor Relations Board, has been issued by Federal Judge Edward J. Moinet on petition of the Chrysler Corp. prohibiting an election among designing engineers employed in the Chrysler plant. The election had been scheduled by the board following a hearing on petition of the Society of Designing Engineers for certification as the bargaining agency for designers in the Chrysler plants. The board has until Feb. 8 to show cause why the order should not be made permanent.

Judge Moinet also issued restraining orders against the board on petition of the General Motors Truck Corp., blocking hearings scheduled by the board for Feb. 4 on complaint of the A.A.W.A. charging the company with discrimination in discharge of three employees and the holding of a hearing on the union's petition for an election at the Pontiac plant. Hearings on permanent injunction will be held Feb. 8.

On page 140 an earlier version of the situation is reported.

Metal Congress and Show in Cleveland Oct. 19-23

The Eighteenth National Metal Congress and Exposition will be held in Cleveland from Oct. 19 to 23, it has been announced by the board of trustees of the American Society for Metals. Floor plans of the exposition, which will be held in Cleveland's Exposition Hall, will be mailed to prospective exhibitors before April 1.

Buick Adds Formal Sedan to Its Series 90 Limited Line

Addition of a new model to its higher priced Series 90 Limited group of motor cars is announced today by the Buick Motor Co. The new model is a formal sedan, combining the qualities of the limousine and the standard six-passenger sedan of the Series 90 Limited group. New bodies by Fisher have a safety plate glass partition separating the driving and rear compartments. This can be raised or lowered by means of a handle installed in the back of the front seat. The car thus may be converted into a full limousine or used as a less formal sedan when not chauffeur driven.

Dimensions of the new car provide 2 in. more leg room than the limousine type of body, with 3 in. more space between the back of the front seat and the wheel. It is designed to accommodate six passengers when used as a sedan, space for three passengers being available in both front and rear compartments.

Instead of a header bar, as in the limousine bodies, the plate glass par-

tion rises flush with the headlining. To conform to sedan specifications, upholstery is the same in both front and rear compartments. In Buick limousine bodies, front compartments are upholstered in leather.

The new model is built on a 138-in. wheelbase chassis and is powered by the Buick valve-in-head straight eight engine used in other Series 90 Limited cars. This develops 120 hp. at 3200 r.p.m., giving a top speed of 87 m.p.h. and acceleration from 10 to 60 m.p.h. at 21.4 sec.

Streamlined in the manner of other Buick cars, the formal sedan likewise has a built-in trunk, a feature of all Buick 1936 sedan models. Safety glass in windshield and all windows is standard equipment. The car is delivered with six-wheel equipment, spare wheels being carried in front fender-wells.

Price of the new Buick Formal is \$1,795 list at the factory, Flint, Mich.

Drum Resigns Presidency of Hupp Motor Car Co.

Vern R. Drum, president of Hupp Motor Car Corp., has resigned. No successor has been elected. It is understood that the directors wish to consult with the Federal Reserve Board in Chicago before making a selection. Mr. Drum became president of Hupp last year following resignation of the late William J. McAneeny.

Counsel for rival factions in the controversy between present Hupp management and Archie M. Andrews have agreed on documents that are to be presented to the U. S. Circuit Court of Appeals in Cincinnati March 3 to which Andrews has appealed decision of the lower court restraining him from interfering with the management.

Probabilities are that a successor for Vern R. Drum, who resigned as president of Hupp Motor Car Corp., will not be chosen until the appeal of Archie M. Andrews, which comes before the Cir-

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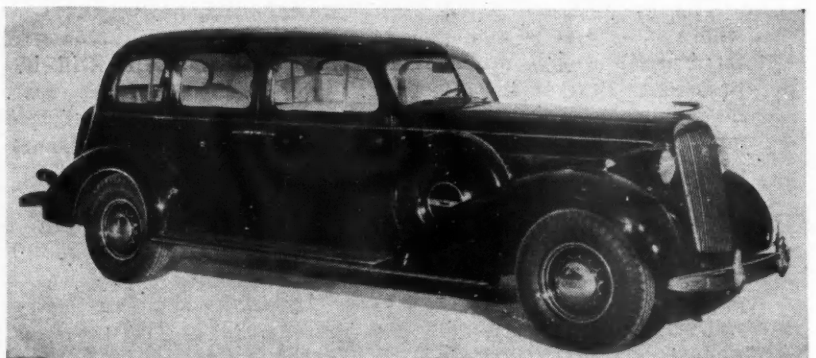
Detroit Union Merger Now Off

Independents Hesitate On Next Move, But Watch A. F. of L. Developments

The amalgamation of independent unions in the motor industry is off, and plans for the constitutional convention which was to have been held in Detroit Feb. 1, have been cancelled. For the time being at least, the "Independents" will go their separate ways with their eyes on the "big league" developments now going on in the American Federation of Labor. A stronger leaning toward one or the other faction of the A.F.L. is discernible among the leaders as well as the rank and file of the independent groups.

The amalgamation movement received its first set-back when the Automotive Industrial Workers Association withdrew from participation in the first convention held in Detroit, Dec. 21, for organization of the Automobile and Metal Workers Industrial Union. That left the Automotive Industrial Workers Association, the Associated Automobile Workers of America and the Mechanics Educational Society to carry on, but the latter organization now has also deserted the cause following the unfavorable vote on the consolidation plan by its national executive committee at its meeting in Cleveland last Saturday.

Interest in the A.F.L. has been quickened by President Green's announcement that an election would be held within 90 days to permit members of its affiliate, the United Automobile Workers, to select their own officers, but independent leaders say that the workers show stronger leanings toward the John L. Lewis faction which is championing the cause of vertical unions, a form more popular with automobile workers. Opposition to Lewis' leadership, however, is detected among many former coal miners now employed



Buick's new Formal Sedan, offered in the Series 90 Limited group. It has a 138 in. wheelbase, and is powered by a 120 hp. valve-in-head straight-eight engine.

in motor plants, and who are familiar with his work in the United Mine Workers of America.

While the kaleidoscopic changes in union affairs have created no little confusion in the minds of workers, and their ultimate allegiance is still in doubt, one thing is evident—there has been a swing in their thinking away from dual or multiple unions toward a single strong organization, whichever that may be. Unquestionably the futile strike at the Motor Products plant which demonstrated the weakness of competing organizations has been a contributing factor.

Elections held Thursday at the Dodge plant under the old Wolman board set-up have raised suspicion in the minds of rival union leaders that the A.I.W.A. might be taking on the complexion of a company union. Frank H. Bowen, regional director of the National Labor Relations Board, has served a subpoena on the Chrysler Corp. calling for its Jan. 25 payroll to be used in determining who is eligible to vote in a proposed election to ascertain strength of the Society of Designing Engineers in that company. Mr. Bowen has been directed to conduct such an election within 10 days as an aftermath of an application of the society that it be designated as the sole bargaining agency for the designers.

The regional board is to hold a hearing Feb. 4 on a petition of the A.A.W.A. to have that union certified as the bargaining agency for all production and maintenance workers in the General Motors plant in Pontiac.

Canadian Car Production Was 172,934 Last Year

Production of automobiles in Canada during December numbered 13,775 units, an increase of 2 per cent over the 13,496 cars made in November. The number of trucks advanced to 2405 from 1454 in November, while the passenger cars fell off to 11,370 from 12,042. Of the December total, 6555 units were made for sale in Canada and 7220 for export. In December of a year ago only 2694 cars were manufactured, the increase this year being due chiefly to the earlier introduction of new models.

For the calendar year 1935, a total of 172,934 motor cars were produced in Canada compared with 116,852 in 1934, and 65,852 in 1933. Of the year's total, 69,501 units were made for export and 103,433 for sale in Canada. The number made for export was 56 per cent above the 1934 total and the number made for the domestic market was 43 per cent higher. In 1935 production amounted to 172,934 and imports to 4110, making an available supply of 177,044 units, but exports totalled 64,556, leaving 112,488 cars as the apparent Canadian consumption. Corresponding figures for other years were; 75,990 in 1934; 46,733 in 1933, and 49,216 in 1932.

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"Sit-Down" Strike Begun by 1200 Firestone Workers

Twelve hundred workers of the Firestone Tire & Rubber Co. in Akron began a "sit-down" strike last Wednesday because the company had refused to reinstate Clayton Dicks, a union worker who had been dismissed. A union committee had requested that Dicks be returned to work pending an impartial investigation of a fight in which he was involved with a non-union worker after an argument over wage rates.

Employees sat idly at their machines night and day, seriously affecting plant operations. When shifts were changed, some of the men remained, so that about twice the normal number of workmen were sitting about the plant. A meeting between company officials and representatives of the union has been agreed upon, but the men stopped work without waiting for the meeting to be held.

Blizzards Reduce Week's Sales 15%

*While Output Exceeds
Sales, New Car Stocks
Are Not Yet Excessive*

By HAROLD E. GRONSETH

Weather extremes are having their customary effect on automobile sales. The blizzards and sub-zero temperatures that have swept over a great part of the country have begun to register in the sales figures being reported to the factories. Only a moderate decline, however, is noted in the figures thus far reported. Five leading companies receiving weekly reports show a drop of less than 15 per cent last week from the volume enjoyed in the week preceding.

Retail sales during the first three weeks of January held fairly steady, gaining slightly as the month progressed until interrupted by the cold wave and storms prevalent during the past 10 days. Deliveries by dealers of companies doing more than 90 per cent of the industry's business up to Jan. 21 were running about 20 per cent under the December level. Whether or not the final week or 10 days of the month will further increase this percentage is still a question.

Sales affected by weather conditions have a habit of rebounding promptly as soon as the unfavorable conditions are removed, and the final 10 days of January do not include a holiday as

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General Motors Reports Profits of \$167,226,000, Best Since 1929

General Motors Corp. reported preliminary 1935 net earnings of \$167,226,000, equal to \$3.69 a share on the common stock, after deduction for preferred dividends. This compared with net earnings of \$94,769,131 for the year 1934. Final quarter 1935 earnings were \$52,744,000.

The record for 1935 was the best for any year since 1929 when net income was \$245,970,393, or \$5.49 a share on the common stock.

Alfred P. Sloan, Jr., president of General Motors, stated that these earnings figures are subject to possible further adjustments upon final closing of the books. Mr. Sloan also said:

"These earnings for the year 1935 are after providing for depreciation of real estate, plant and equipment, amounting to approximately \$35,000,000, which compares with a provision of \$32,616,832 in the year 1934.

"The preliminary figure for cash, United States Government and other

marketable securities at Dec. 31, 1935, amounted to \$200,100,000, compared with \$186,966,609 at Dec. 31, 1934. Preliminary net working capital at Dec. 31, 1935, amounted to \$322,400,000, compared with \$273,174,677 at Dec. 31, 1934.

"During 1935, total sales to dealers, including Canadian sales, overseas shipments and production from foreign sources amounted to 1,715,688 cars and trucks, compared with 1,240,447 cars and trucks in 1934—a gain of 475,241 units, or 38.3 per cent. General Motors dealers in the United States delivered to consumers 1,278,996 cars and trucks during 1935, compared with 927,493 cars and trucks in 1934—a gain of 351,503 units, or 37.9 per cent. Sales by General Motors operating divisions to dealers within the United States during 1935 amounted to 1,370,934 cars and trucks, compared with 959,494 cars and trucks in 1934—a gain of 411,440 units, or 42.9 percent.

Biggest 1935 Percentage Gain Was in \$501-\$750 Price Class

Passenger Car Production by Wholesale Price Classes (U. S. and Canada)

Twelve Months, 1935 and 1934, Compared

	1935	1934	Per Cent Change	Per Cent of Total	
				1935	1934
\$500 and under.....	1,999,451	1,470,032	+36.0	58.37	64.74
\$501-\$750	1,273,141	689,314	+85.0	37.17	30.36
\$751-\$1,000	108,517	66,223	+64.0	3.17	2.92
\$1,001-\$1,500	28,232	27,576	+2.8	.82	1.21
\$1,501-\$2,000	8,716	8,391	+4.0	.25	.37
\$2,001-\$3,000	5,413	6,879	-21.2	.16	.30
\$3,001 and over.....	2,108	2,151	-2.2	.06	.10
Total.....	3,425,578	2,270,566	+50.9	100.00	100.00

Truck Production by Capacities (U. S. and Canada)

Twelve Months, 1935 and 1934, Compared

	1935	1934	Change	1935	1934
1½ tons and less.....	710,416	554,605	+28.2	93.86	92.53
2 to 3 tons.....	35,421	35,938	-1.3	4.68	5.99
3½ tons and over.....	6,442	6,463	-0.5	.85	1.08
Special and buses.....	4,640	2,391	+94.0	.61	.40
Total.....	756,913	599,397	+26.3	100.00	100.00

Giant Trucks Will Carry GM's "Parade of Progress"

A fleet of eight trucks, believed to be the largest cab-over-engine type ever constructed, was recently completed in the Fleetwood plant of the Fisher Body Corp. in Detroit. The fleet is now in use transporting the automotive and home exhibits of the General Motors Parade of Progress, a "world's fair on wheels," which has begun in Florida a 20,000 mile nation-wide tour.

These highway leviathans, measuring 33 ft. from bumper to bumper, were designed by the art and colour section of the General Motors Corp. in collaboration with the layout men of Fleetwood, builders of Cadillac custom bodies, and are described as embodying the most advanced principles of streamlining. They are finished in silver and red paints and weigh about seven tons when fully loaded. The chassis and engines of these streamliners are by General Motors Truck Corp. and are built on a wheelbase of 233 in. The 15-foot propeller shafts are in three sections.

Additional automotive equipment in the big caravan includes three tractor-and-trailer units, each 28 ft. long. One houses the power plant, the second is equipped as a rest and locker room for the crew, while the third is fitted as a sound motion picture projecting truck and photographic darkroom for the development and printing of films. The tractors are Chevrolet standard 1½ ton, dual wheel, 131-in. wheelbase.

The complete caravan numbers 28 units, extending more than two miles on the highway, with 200-foot intervals

between each vehicle, as a safety measure and a courtesy to other motorists. The 11 truck units are supplemented with 1936 models from each of the five General Motors car divisions—Chevrolet, Pontiac, Oldsmobile, Buick, and Cadillac-LaSalle.

Special Bus Chassis Introduced by Ford

Adding to the Ford V-8 commercial chassis types, the Ford Motor Co. announces the introduction of a new bus chassis, available either in 131½ or 157 in. wheelbase.

Standard equipment on the new chassis includes bus type electrical equipment with a 12-volt 300-watt generator with twin belt drive, a special 12-volt storage battery, heavy duty wiring with 12-volt lighting equipment, vacuum power brakes, special bus type

clutch, front shock absorbers and dual rear wheels.

A choice of 5.14 to 1 or 6.6 to 1 rear axle gear ratio at no extra cost is also provided.

The 131½ in. wheelbase chassis has a factory list price of \$740 and the 157 in. wheelbase lists at \$765.

Making of Thiokol Shown at Luncheon

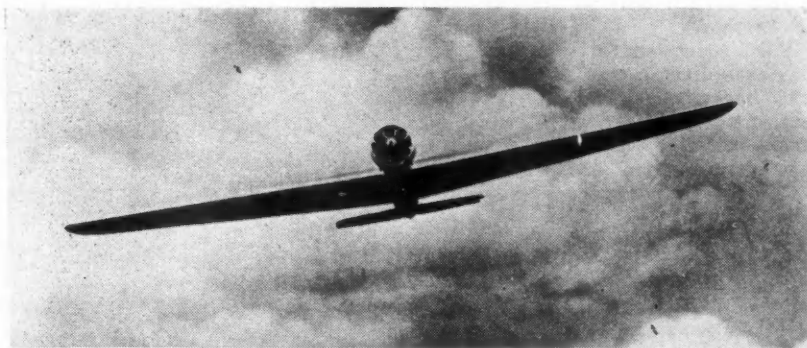
New Synthetic Rubber Produced from Natural Gas, Salt and Sulfur

A demonstration of how Thiokol, a synthetic rubber, is produced by a reaction between ethylene dichloride and sodium polysulfide, was given at a luncheon at the Biltmore Hotel in New York last Monday, attended by representatives of industry and of the technical press. The discovery that rubber can be produced in this way was made accidentally during the early 1920's by Dr. J. C. Patrick of Kansas City. Dr. Patrick mixed these two liquids in an attempt to produce a new, inexpensive anti-freeze for automobiles when, to his surprise, instead of the expected new liquid, a gummy-looking mass was formed, of the general appearance and properties of crude rubber. This is said to have been the first synthetic rubber produced in the United States.

The basic materials from which the two chemicals used in the production of Thiokol are made, are natural gas, salt and sulfur, all of which are found in this country in great abundance. It appears that Thiokol cannot be produced as cheaply as crude rubber, and therefore will not replace the plantation product, but it has certain physical properties distinguishing it from crude rubber which make it suitable for certain purposes for which natural rubber cannot be used. The principal one of these special properties is that it is not attacked by petroleum products such as gasoline, kerosene and lubricating oil. Another property which distinguishes it from natural rubber is that it is not subject to attack by the



Three of the eight stream-lined trucks which will carry the G. M. "Parade of Progress" on its 20,000-mile journey.



"Greatest sensation of aviation since the Wright Brothers' flight," is the claim Britishers make for their new Vickers Wellesley monoplane. Built of wafer-thin spars and tubes, it could be riddled by bullets without causing the plane to collapse, it is claimed.

ozone produced by the silent discharge from high - tension electric cables known as "corona."

Thiokol is vulcanized and processed exactly like natural rubber. However, whereas the natural rubber always consists of isoprene (C_5H_8), Thiokol can be given different compositions right from the start, and three distinct grades are now produced.

One of the uses of Thiokol is for the insulation of high-tension electric cables, such as those used for connecting the ignition distributor to the spark plugs. Originally these cables were made with plain rubber insulation, and those whose memory goes back to the early days of high-tension ignition will remember what a source of trouble the unprotected rubber coatings of the early high-tension cables were. The silent discharge from the cables (corona) produces ozone, and ozone is very destructive to rubber. The result was that the rubber insulating coatings cracked and their insulating properties practically vanished. This difficulty was later overcome by protecting the rubber insulation by braiding and varnish.

Some modern electric cables are given a number of coatings of natural rubber and an outer coating of Thiokol, and the whole of the insulating coatings is then vulcanized together. A manufacturer of electric cables who was at the luncheon said Thiokol alone would be used for the insulation if it were not for the higher cost of the material.

The immunity of Thiokol from attack by oil and gasoline has led to extensive uses in the oil industry and in automotive equipment. The Air Corps of the U. S. Army is said to have written it into its specifications for gasoline hose, and the fuel tanks of the China Clipper were sprayed on the inside with Thiokol in liquid form to seal them against fuel leakage.

Thiokol is being produced by Thiokol Corp. in a plant at Yardville, N. J., a suburb of Trenton. It is now available as sheet stock, as a liquid, and in powder form for molding. As mentioned in a recent issue of *Automotive*

Industries, powdered Thiokol lends itself to the production of smooth, glossy, oil-proof moldings.

In certain automobiles on which the fuel-tank filler is located on the fender, Thiokol is used for the hose extending from the filler to the tank. A number of large oil companies are using Thiokol-lined pump hose and tubing. It is also used for sealing the floating roofs of gasoline storage tanks. Such hose is used also for paint-spraying equipment. All three of the large production automobiles on the American market today are said to have some Thiokol in their make-up.

William B. Taylor, automotive and marine engineer, has been appointed to the engineering staff of the Eddy Marine Co. He will act in an advisory capacity on all mechanical installations at the company's plant in Bay City, Mich.

Sheet Steel Demand Still at Low Level

Detroit Price Concession Spreading, but Bars and Alloys Continue Steady

While this week's developments indicate a further slowing down in automotive demand, the steel market accepts the lull as nothing more than a prelude to a revival of buying on a broader scale before the end of the current quarter. Statistics of the National Association of Flat Rolled Steel Manufacturers show that its membership started the year 1936 with a backlog very close to capacity, 299,394 tons. Total sheet capacity of the United States is estimated at 500,000 tons and that of this organization's membership at 303,000 tons. It is assumed that in January the unfilled tonnage volume was sharply lessened, fresh commitments having in all probability dipped considerably below the 200,000 tons recorded in last year's closing month.

While some sheet and strip mills have lowered their operating rate by as much as 25 per cent, so as to be doubly certain that their backlog will tide them over whatever dull buying period may be ahead of them, others have whittled down current rate of output only slightly. A good deal of routine sheet business overhangs the market and is confidently expected to come through within the next few weeks.

The price situation is unchanged. The concessions, that first cropped up in the Detroit market, have become more or less general in all of the

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New Truck Registrations (Revised)¹

	September, 1935	October, 1935	November, 1935	Eleven Months, 1935	1934
Ford	13,715	12,362	14,191	172,084	121,904
Chevrolet	13,271	9,150	10,875	154,654	149,588
Dodge	5,635	6,822	4,642	56,854	43,596
International	4,963	5,350	4,136	49,419	29,047
G. M. C.	1,307	907	783	10,098	9,695
Diamond T	529	557	378	5,941	5,075
Reo	385	412	273	4,550	4,679
White	249	381	334	2,994	3,710
Willys-Overland	254	218	202	2,083	24
Studebaker	167	209	137	2,001	1,572
Federal	196	198	227	1,987	1,823
Mack	81	136	137	1,374	1,732
Brockway	106	129	116	1,134	1,143
Autocar	75	92	89	844	1,062
Stewart	90	94	91	781	694
Indiana	101	163	102	730	699
Terraplane	65	33	13	622	479
Plymouth	48	43	35	540	117
Henney	3	..	..	323	247
Divco	27	37	23	312	229
F. W. D.	16	11	26	191	144
Austin	7	5	5	175	450
Sterling	9	17	17	157	115
Sayers & Scoville	5	..	..	137	130
Twin Coach	11	16	6	130	186
Meteor	2	..	..	122	167
Buick	1	1	4	113	136
Misc.	72	96	93	1,135	1,373
Total	41,390	37,439	36,935	471,425	379,816

(1) Truck registrations for these three months, as they appeared in previous issues of *Automotive Industries*, were somewhat confusing as they contained bus registrations also. The above table gives revised truck registrations only, with bus figures eliminated.

Blizzards Reduce Week's Sales 15%

(Continued from page 139)

did the corresponding period of December. The strength of retail demand in the face of adverse conditions has proved highly encouraging to sales executives, some of whom are of the opinion that sales have a good chance of snapping back to the December level next month, provided weather conditions are at all favorable.

December brought a bigger volume of retail business than had been estimated. Final figures show deliveries by dealers of 254,000 passenger cars and 42,000 trucks, or a total of 296,000 vehicles compared with 310,000 units in November. With customary year-end lag, registrations were expected to fall somewhat short of these figures.

Returns from 38 states indicated registrations in December of 231,000 passenger cars and 38,000 trucks, or a total of 269,000 vehicles, establishing a new record for that month and compar-

ing with 257,197 cars and trucks titled in November.

While production for some time has been exceeding sales and dealers' stocks have been climbing, new car stocks in the field are not as yet considered excessive, being estimated in the neighborhood of 390,000 units at the start of the year or about six and one-half weeks' supply on basis of January rate of sales. Undoubtedly they have increased further during the current month, but with the spring selling season in the offing the dealers new car inventory position is not looked upon as unhealthy.

Used car stocks, however, are skirting the all time high of 1929.

S. D. Williams has been promoted by the Timken Steel and Tube Co. to the position of director of sales, with headquarters in Canton, Ohio. Mr. Williams has been with the Timken organization since 1926, starting as metallurgical sales engineer and becoming manager of tube sales in 1935.

Gardner Smith, Los Angeles, has been appointed sales representative of the Toledo Steel Products Co. in Southern California and Arizona. Mr. Smith will be assisting Jim Gay, long-time Toledo representative on the West Coast.

Timken Announces Promotions and Transfers of Executives

S. C. Partridge has been appointed assistant general manager of the industrial division of Timken Roller Bearing Co., with headquarters in Canton, Ohio, according to announcement by the company. Mr. Partridge has been with Timken since 1925.

F. B. Yates has been promoted to the position of manager of Timken's New York district office, in charge of industrial sales. Mr. Yates joined the Timken organization in 1926, and has been with the New York office since 1928.

The promotion of S. C. Merrill to the position of eastern district manager of the automotive division, with headquarters in Detroit, has also been announced by the Timken Roller Bearing Co. Since 1924 Mr. Merrill has been manager of the New York district office of the company.

R. W. Powers has been transferred from the Canton engineering department of the company to the New York office as sales engineer, assisting Mr. Yates.

Dollar Value of Automotive Exports Rose 19% Last Year; Dec. Exports 59% Higher

Exports and Imports for the Automotive Industry for December and Twelve Months Ended December 1935 and 1934

	December 1935		December 1934		Twelve Months Ended December 1935		Twelve Months Ended December 1934	
	Number	Value	Number	Value	Number	Value	Number	Value
EXPORTS								
Motor Vehicles, parts and accessories.....	....	\$19,722,925	....	\$12,410,016	....	\$227,290,219	....	\$190,208,413
PASSENGER CARS								
Passenger cars and chassis.....	17,736	9,378,181	8,279	3,892,633	173,681	94,974,025	145,157	78,258,000
Low price range \$850 inclusive.....	16,545	8,110,802	7,640	3,253,537	161,535	81,867,580	133,417	65,363,798
Medium price range over \$850 to \$1,200.....	842	784,475	356	348,340	8,759	8,304,968	7,753	7,482,877
\$1,200 to \$2,000.....	208	311,405	89	134,752	1,463	2,224,426	2,018	3,063,008
Over \$2,000.....	57	132,946	41	99,660	816	2,113,783	726	1,873,678
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total).....	10,276	4,664,174	7,141	3,734,224	99,080	50,582,436	92,723	44,207,307
Under one ton.....	1,006	345,262	832	290,936	9,982	3,369,120	9,576	3,158,847
One and up to 1½ tons.....	8,312	3,498,436	5,280	2,334,221	72,103	32,813,663	71,649	30,168,556
Over 1½ tons to 2½ tons.....	771	602,511	831	673,719	14,057	10,380,179	9,340	7,552,339
Over 2½ tons.....	153	185,296	169	427,045	2,403	3,571,815	1,763	3,078,562
PARTS, ETC.								
Parts except engines and tires.....	....	....	....	....	....	44,473,196	....	36,247,289
Automobile unit assemblies.....	....	2,553,717	....	2,131,626	....	26,356,207	....	21,916,877
Automobile parts for replacement (n.e.s.).....	....	2,157,562	....	1,891,808	....	3,060,436	....	2,587,619
Automobile accessories (n.e.s.).....	....	186,303	....	234,296	....	4,053,707	....	2,416,042
Automobile service appliances.....	....	303,739	....	199,733	....	6,598,515	....	8,195,484
Airplanes, seaplanes and other aircraft.....	11	434,746	19	451,073	333	5,069,810	490	4,860,567
Parts of airplanes, except engines and tires.....	....	278,987	....	430,713	....	....	....	....
INTERNAL COMBUSTION ENGINES								
Stationary & Portable								
Diesel and semi-Diesel.....	30	175,376	27	108,325	331	978,474	155	478,632
Other stationary and portable.....	1,318	45,990	964	47,777	10,196	570,016	6,311	391,904
Not over 10 hp.....	99	67,147	69	33,104	1,410	812,700	1,129	633,629
Over 10 hp.....	....	....	....	....	....	....	....	....
Automobile engines for:								
Motor trucks and buses.....	2,435	213,471	297	39,038	9,251	1,004,196	4,142	544,906
Passenger cars.....	3,191	231,083	1,557	104,193	29,193	1,996,908	22,005	1,399,471
Engines and aircraft.....	14	67,003	68	541,298	568	2,459,317	1,009	4,458,701
Accessories and parts (carburetors).....	....	125,202	....	109,710	....	1,598,908	....	1,355,977
IMPORTS								
Automobile and chassis (durable).....	41	15,067	59	25,938	591	281,465	585	175,851



Power rotates the tool that goes 'round and—anyway, it runs the tire into place on the wheel. Pontiac has four of these tire mounters, made from salvaged drill presses.

GM Expands in Air Conditioning Field

New Subsidiary Will Market Both Delco and Frigidaire Equipment

General Motors Corp. plans a program of expansion in a comparatively new industry, air conditioning, and has organized a new company for the marketing of year-round air conditioning and automatic heating products, it was announced today by Alfred P. Sloan, Jr., president.

The new company will be known as Delco-Frigidaire Conditioning Corp. Its general headquarters will be in Dayton, Ohio. Sales headquarters for all eastern states will be located in New York City.

Organization of Delco-Frigidaire Conditioning Corp. will place under one direction the marketing of summer air conditioning equipment manufactured by Frigidaire Division and of winter air conditioning and automatic heating equipment manufactured by Delco Appliance Division. Manufacturing of the different types of air conditioning products will remain with Frigidaire and Delco Appliance Divisions at their plants in Dayton, Ohio, and Rochester, N. Y.

Both Frigidaire and Delco Appliance Corp. have been active for years in the design, manufacture and sale of air conditioning equipment, Frigidaire concentrating upon the type of products necessary for cooling and dehumidification, and Delco Appliance devoting its efforts toward supplying products for automatic heating, humidification and purification of air.

With the progress made by both of these General Motors units in their respective fields of air conditioning, Mr. Sloan's announcement stated, and the possibilities the air conditioning business now offers in home, office, store and industrial applications, it has been deemed wise to coordinate the development and sales efforts in order that equipment for all year use may be marketed under a single company.

"In establishing this new company," Mr. Sloan stated, "General Motors is encouraged by the thought that air conditioning, in its complete phase, namely, the conditioning of air the whole year, is needed in virtually every type and size of residential, business or industrial building. We have faith in the possibilities of this new industry and we sincerely believe that through this new organization the corporation will be able more aggressively to develop, manufacture and market year-round air conditioning equipment that will be of service to mankind in all climes."

A. F. McGraw has been named sales promotion manager of the tractor division of the Allis-Chalmers Manufacturing Co., including both industrial and agricultural lines.

N. Y. Boat Show Reports Two Millions in Sales

Sales of engines at the Motor Boat Show in New York last week are estimated at 130, of which 42 were Diesels. This figure is understood to be considerably higher than last year, although no figures were reported then. Diesel sales a year ago, it is understood, were only five engines.

Sales of boats are reported as 1004, of which 200 were toy sailboats, 77 cruisers, and the balance divided between speed boats, runabouts and larger sailboats. No comparison is possible with 1935 as sales were not reported last year. Dollar volume of business done at the show is estimated between \$1,500,000 and \$2,000,000. Accessories accounted for another half-million dollars.

Evans-Walton Co. Formed to Make and Sell Accessories

The Evans-Walton Co. has been organized as a Michigan corporation to handle the manufacture and sale of products developed by E. S. Evans and Sons, it was announced today by Thomas R. Walton, vice-president and treasurer of the new company.

The products include: the Evans bat-RE-charger, the Evans Wiper Blade Refill and a new product which will be known as Touchup Tape. These articles were developed during the last several years by E. S. Evans and Sons, who will continue in the development of new items, Mr. Walton said.

The new products will be marketed through dealer organizations of automobile manufacturers, jobbers and leading chain store organizations throughout the country. R. B. Evans is president of the Evans-Walton

Company. Offices and plant are located at 243 West Congress Street, Detroit. Mr. Walton formerly was vice-president of the Detroit Motor Valve Company and also was vice-president and general manager of the McAleer Manufacturing Company, Detroit.

Drum Resigns Presidency Of Hupp Motor Car Co.

(Continued from page 138)

cuit Court of Appeals at Cincinnati, March 3, is out of the way.

"We have given some consideration to a successor," said a director, "and have canvassed the field of available men, but there is little point in making a selection until the Andrews suit is settled."

The litigation also is holding up financing negotiations of the corporation which applied to the Federal Reserve Bank of Chicago for a mortgage loan of \$1,500,000. Mr. Andrews is appealing from the decision of District Judge Arthur J. Tuttle, holding invalid stock options and other contracts secured while he was in control of Hupp.

The plant has been closed since late in December for lack of working capital.

Nash Introduces \$25 Plan for LaFayette

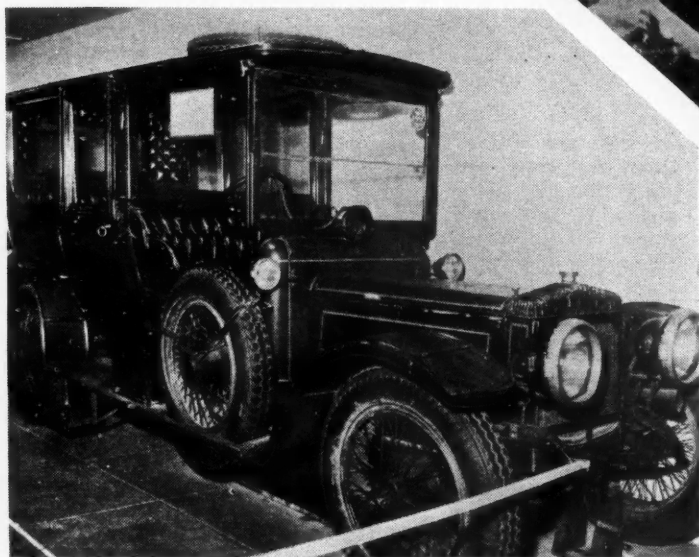
LaFayette cars will be sold under a \$25-a-month time payment plan, according to an announcement made by the factory this week. The \$25 monthly payments will include insurance coverage and finance charges at ½ of 1 per cent a month.

The \$25 plan will not apply to other Nash cars, although a similar principle, with different amounts to be paid each month, will be used.

The World on Wheels

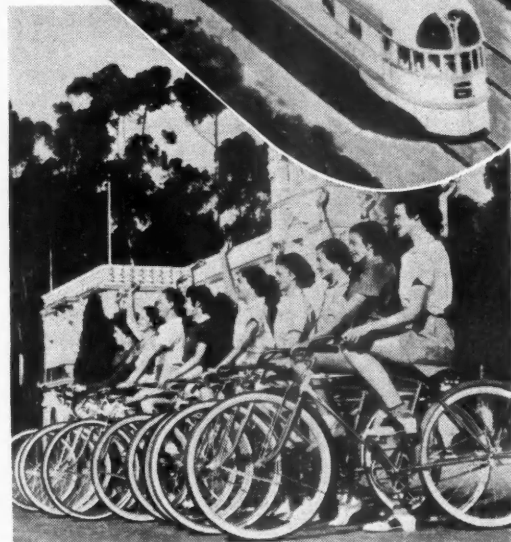
Like many white cats, this one is deaf, and its Broadstairs, England, mistress attaches a sign to it to warn motorists.

Chicago to Denver in 16 hours will be the schedule of these new ten-car, stream-lined, stainless-steel trains being built by the Edw. G. Budd Mfg. Co. for the Burlington Railroad.



(Above) This ancient Daimler-Knight was used by the late King George V. from 1910 to 1924. It is now exhibited in the Los Angeles Museum.

(Right) Training for the six-mile bicycle race—ladies only—which will be run at the San Diego, Calif., exposition.



(Below) A squadron of new German pursuit planes lines up for a practice flight.



(Lower right) Penarth in Wales finally decided to sell its 23-year-old fire engine, first used in the British provinces. It cost £1500 and was sold for £20.



International, Aeme and Globe photos.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

Despite the extremely cold and stormy weather throughout the country, retail and wholesale trade increased last week. There was only a moderate increase in business activity as a whole. Electric output was slightly lower, while petroleum runs, coal output, and steel production registered slight gains.

The Guaranty Trust Co.'s index of business activity for December stands at the preliminary figure of 81.8, as against 80.3 the month before and 68.2 a year ago. The company's index of wholesale commodity prices on Jan. 15 was 53.9, as compared with 52.5 a month earlier and 52.8 a year earlier.

Carloadings Slightly Lower

Railway freight loadings during the week ended Jan. 18 amounted to 611,408 cars, which marks a decline of 3620 cars below those during the preceding week, a rise of 48,582 cars above those a year ago, and a gain of 49,506 cars above those two years ago.

Food Costs Rising

Retail food costs during the two weeks ended Dec. 31 increased 0.6 per cent, according to the Bureau of Labor Statistics. The index stands at 82.5, based on the 1923-25 average as 100, as against 74.5 a year ago. Food costs are now 22 per cent lower than on Dec. 15, 1929.

Foreign Trade Nearly Balanced

Exports during December declined

more than seasonally, while imports gained contrary to the usual seasonal movement. Exports declined 17 per cent, as compared with those in the preceding month, while imports increased 10 per cent. For the entire year 1935, exports amounted to \$2,282,023,000, which marks an increase of 7 per cent above those in 1934, while imports totaled \$2,047,797,000, showing a rise of 24 per cent.

Farm Wages High

According to the Bureau of Agricultural Economics, farm wages are the highest for any winter in four years. The demand for farm labor at the beginning of the year was about 76 per cent of normal, and the surplus of supply over demand was less than it was a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended Jan. 25 stood at 83.9, as against 83.8 the week before and 84.4 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Jan. 22 showed an increase of \$1,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of Government securities remained unchanged. Money in circulation declined \$18,000,000, and the monetary gold stock increased \$14,000,000.

days, in Chile in four days, and in Peru in six days.

Another plan to supply French motorists with a "carburant national" or native fuel has gone by the board. It was sponsored by a certain Monsieur Saheurs who pretended to be able to transmute water into gasoline. The hangar and the mechanical equipment intended for the exploitation of the invention were sold recently and the development scheme has been abandoned.

New Sales Organization Set Up by GM Truck Co.

Coincident with the introduction of its 1936 truck line, General Motors Truck Co., Pontiac, Mich., is inaugurating a new sales and merchandising policy designed to expand sales outlets and contacts, particularly for the lighter vehicles. For this purpose, the company has set up five regional offices controlled by the factory and blanketing the entire country. Offices and personnel are as follows: Eastern, E. T. Herbig; Midwestern, L. L. Tremper; Central, W. A. Casey; Southern, H. J. Wasson; Pacific, H. W. Howard.

The company's zone organization is continued, but there is a technical change in structure by setting up "key dealers" instead of distributors. Factory branches in New York City and Newark have been discontinued and service will be handled by independent organizations. Commercial Sales Corp. will handle New York service.

Interlake Building Plant For Iron Paving Plates

Interlake Iron Co. of Toledo, Ohio, has announced that contracts totalling \$100,000 have been let and work begun on its new plant for the production of iron paving plates. It will be the first plant of its kind in the United States.

The new form of paving was one of the big features of the Highways Exposition recently held in Cleveland. It is reported to be virtually non-skid and wear-proof. Exhaustive tests have proved iron plate paving to be as much as five times more durable than other paving material, outwearing even granite blocks. It is also said to reduce wear on automobile tires. In price, the iron paving compares favorably with brick, asphalt and other materials. It has been used successfully in Europe for a number of years.

The iron plate is constructed in the form of a 10½-in. triangle and is 1½-in. in overall thickness. Around the outer edge of the bottom of the plate is a flange about one inch deep and one-half inch thick, with air space in the center for anchoring in a concrete base.

Lester W. Seago has been appointed eastern district manager of the Ready-Power Co., Detroit, with offices at 1775 Broadway, New York.

DuPrene Adopted by U. S. Air Corps for Fuel and Oil Lines

Following extensive experiments conducted for more than a year, the U. S. Army Air Corps has adopted DuPrene, a synthetic rubber manufactured by the du Pont Company, as standard for lining fuel and oil line connections and for radiator connections on airplanes, the latter where planes are water-cooled.

These connections are used to prevent the vibration of the motor from breaking the fuel and oil lines through crystallization of the metal tubing. In the experiments preceding its adoption, DuPrene was found to resist deterioration by oil and greases and to be unaffected by anti-freeze solutions.

Overseas Notes

At its fifty-ninth session the Transit and Communications Committee of the League of Nations adopted a resolution recommending the adoption in all

European countries of luminous traffic signals based on the system in use in England, in which red, orange and green colors are used. The committee also recommended that identical signs or marks be installed in all countries to denote zones in which overtaking is prohibited.

The Ford Motor Co. has entered into negotiations with the Polish Government with a view to the erection of an automobile factory in Poland, according to a report in a French publication, *L'Officiel de L'Automobile*.

The first plant in France for the synthetic production of gasoline from coal by hydrogenation was inaugurated at Bethune on Dec. 9, 1935, in the presence of high personalities of the military and political world.

Since Jan. 5 an "all-air" mail service is in operation between France and South America. Letters from France are delivered in Brazil in two days, in the Argentine and Uruguay in three

Michigan Dealers Seek State Tax Reduction

"Profit with Every Sale," is the resolution of the Michigan Automotive Trade Association for 1936. That was the declaration of its new president, Howard J. Cook of Lansing, in an address given at a joint meeting of the M.A.T.A. and N.A.D.A. in Detroit.

To increase profit possibilities for the dealers in Michigan during the coming year, M.A.T.A.'s major objectives are classified under two headings: First, those of a legislative character; and second, the objectives that must be reached by dealers to lower the now tremendous cost of retailing automobiles.

"In respect to our immediate necessities for tax relief in the State, the M.A.T.A. is now organizing the entire dealer body in a State-wide and vigorous appeal to Gov. Frank D. Fitzgerald and the State Tax Board," said Mr. Cook. "We are appealing for an immediate change in the interpretation of the Sales Tax Act, which, under the present ruling, allows the pyramiding of the 3 per cent tax on used car trade-ins." Factory executives are cooperating with the association in obtaining their dealers' signatures to petitions now being circulated throughout the State, requesting that tax returns be made on basis of actual gross receipts rather than on theoretical gross receipts from sales as at present.

The M.A.T.A. also is sponsoring passage of a compulsory inspection law which "should clear the now glutted market of thousands of dangerous vehicles that have outlived their usefulness."

Schotters Becomes President of Luce Manufacturing Co.

At the annual meeting of stockholders of Luce Manufacturing Co., Lansing, Mich., Frank A. Schotters, vice-president and treasurer, was elected president succeeding Homer D. Luce, who retires from active participation in the business but continues as chairman of the board. Lee Richardson, Detroit, was elected vice-president and Carl H. Reynolds, Lansing, secretary. Mr. Schotters continues in the capacity of treasurer and general manager. The officers, together with Mr. Luce and Lee Joslyn, Detroit, constitute the board of directors, which was reduced from seven members to five. Mr. Schotters reported that current schedule was heaviest in five years and 40 per cent higher than the peak of 1935.

CIT Announces New Finance Plan for '34-'36 Used Cars

Commercial Investment Trust Co. has announced to dealers two new finance plans. One provides floor planning for small dealers who handle only a few cars a year at a cost of about

one-half per cent a month on loans of about one-half the trade-in value.

The other plan extends new car financing rates and terms to the public on 1934, 1935 and 1936 used cars. The terms include one-third down payment and up to 18 months to pay at one-half per cent a month. The usual 40 per cent down payment and other regular terms still apply to older used cars, but it is understood the company will accept one-third down in many cases.

Index in Preparation

The editorial index of Volume 73 of AUTOMOTIVE INDUSTRIES (issues of July 6 to Dec. 28, 1935, inclusive) is now in preparation. Copies may be obtained gratis, while the supply lasts, on application to the editorial department.

Italian Carburetor Uses Alcohol as Motor Fuel

With an embargo on oil imports threatening as a feature of League of Nations sanctions, Italy has been endeavoring to find substitutes for gasoline which would make her independent of foreign supplies. Press reports state that the use of straight alcohol for motive power has been worked out by Salvatore Ghelfi of Rimini, and that it is being employed successfully in several experimental cars.

The special carburetor, it is claimed, uses ordinary denatured alcohol with satisfactory results, the high water content of the alcohol acting as a cooling agent. For starting up cold, there is a device for injecting a few drops of gasoline in the carburetor.

Foundrymen's Assoc. Appoints E. O. Jones Safety Director

The American Foundrymen's Association announced the appointment of Ellsworth O. Jones as director of its recently formed safety and hygiene section. For the past three years Mr. Jones has been consultant for the industrial relations bureau of the National Founders Association. He is known widely through his work with National and State organizations in the study of industrial dust problems, with which his work with the A.F.A. will largely deal.

Canton Foundry & Machine Co. Moves Offices to Cleveland

The Canton Foundry and Machine Co. announces that it has moved its general offices from Canton, Ohio, to its new factory at 6400 Breakwater Avenue, Cleveland, Ohio. The factory has been located at Cleveland since 1929, although the general offices until now had remained at Canton.

Bohn Earnings Estimated at \$4.50 Per Share for 1935

Estimated earnings of the Bohn Aluminum & Brass Corp. and its subsidiaries for 1935 were between \$4.50 and \$4.55 per share. This compares with \$4.31 per share for the preceding year.

As a result of the increased earnings of the company, which maintained its dividend rate at 75c per share per quarter, the financial position has materially improved. Current assets at the end of 1935 were approximately \$6,500,000, as compared with \$5,464,425 at the end of 1934. Liabilities have been decreased by the retirement of the balance of the outstanding bonds of the company to the extent of \$500,000. The Bohn company now has no funded indebtedness outstanding.

William C. Acklin Becomes President of Stamping Co.

William C. Acklin has been named president of the Acklin Stamping Co. to succeed his brother, James M. Acklin, who was injured fatally in an automobile accident recently. Mr. Acklin, secretary of the company since 1911, has acted as general manager since 1926. Frank E. Graper was elected first vice-president and works manager, with F. C. Greenhill, second vice-president and sales manager, and A. E. Seeman, treasurer and assistant secretary.

S. S. Miller's 80th Birthday

S. S. Miller, chairman of the board of the Mohawk Rubber Co., of Akron, Ohio, and in 1898, first superintendent of the Goodyear Tire & Rubber Co., will celebrate his 80th birthday Feb. 7. He will be the guest of honor at a reception given by his Mohawk associates. Mr. Miller, after starting with Goodyear in 1898, superintended construction of the Kelly-Springfield Tire plant in Akron and served as its factory manager until 1912. In 1913 he became one of the founders, and the first factory manager of the Mohawk Co. He was president for many years, becoming chairman of the board in 1931.

Alden Improving Rapidly

Col. Herbert W. Alden, chairman of board, Timken Detroit Axle Co., who received very serious injuries in an accident in the factory laboratory a week ago, is reported to be in greatly improved condition. He is in a cheerful frame of mind and is getting along better than was expected.

Al Gordon

Al Gordon, veteran automobile race pilot, was killed last Sunday when his machine blew a tire at the Ascot Speedway, Los Angeles, and crashed over the retaining wall. His mechanic, "Spider" Matlock, was also killed.

Canadian Tariff Board Closes Motor Hearings

A complete picture of the Canadian automobile industry, its claims for protection and arguments against protection, is now before the Tariff Board at Ottawa, Ont., as a result of the automobile hearing which ended last week. With interruptions, the hearing lasted three weeks. In final submissions to the board, representatives of the western provinces contended the tariff on automobiles should be reduced or removed, and argued manufacturers had advanced no arguments to justify their protection. On behalf of the maritime provinces it was submitted the tariff should be reduced sharply to a maximum of 12½ per cent on automobiles, and 15 per cent on automobile parts.

The last word of the hearing was from Wallace R. Campbell, president of the Ford Motor Co. of Canada, Ltd., who replied to the provincial government representative. He said the automobile industry needed protection to the same extent as other secondary industries in Canada, and submitted it was now too late for Canada to turn back on industrialization after large manufacturing industries had been established in Canada. If the tariff were removed or lowered to an extent which would make it uneconomical to manufacture cars in Canada, they would be imported from the United States, said Mr. Campbell. If this were done with all secondary industries it would mean an economic surrender to that country, and political surrender would not be far behind.

In the next few weeks the board will have to study a huge mass of material gathered before it. Apart from the arguments and evidence submitted at the hearing, all the companies concerned submitted voluminous records and confidential information concern-

ing their affairs. In addition, the board's auditors made exhaustive private investigations and submitted their findings in bulky volumes. The board expects to have its report completed and submitted to the Minister of Finance in time to enable the Government to give effect to any tariff changes it suggests in the 1936 Budget.

Kay Don Pays Visit to Pontiac Factory

Kay Don, noted British racer, spent Tuesday in Detroit conferring with officials of Pontiac Motor Car Co. Don, as head of Sole Concessionaires, Ltd., London, is distributor for Pontiac Motors in Great Britain. He has 30 dealers handling Pontiac cars for him in the British Isles and the story of how he happened to connect up is interesting. Last spring he came to America for a visit and headed for Florida about the time Sir Malcolm Campbell was trying for a new record on Daytona Beach. He happened to make the trip south in his father-in-law's Pontiac car and immediately upon his arrival asked his American manager, William F. Sturm, how he could go about it to get the representation for Pontiac in England. He said he liked the car so much that he felt sure he could sell them. Representing an American automobile was the farthest thing from his mind when he arrived in this country, but arrangements were made quickly and soon after his return home Sole Concessionaires, Ltd., was formed.

Twenty General Motors Export Corporation representatives from many parts of the world were guests of Pontiac Motor Co. Wednesday. These men are in this country as a reward for excellent sales performance during the year 1935.

NADA Sets March 1 Deadline for Plan

Twenty Per Cent Used Car Profits Program Before Dealers for Vote

Jack Frost, general manager and executive vice-president of the National Automobile Dealers Association, whose proposal for establishment of gross profit in used-car department to stop present ruinous losses was approved by the board of directors at the recent meeting in New Orleans, has set a dead line of March 1 for the trade as a whole to decide whether it wants the proposal put into effect.

Ballots for voting on the proposal, a booklet explaining it in detail, and a letter putting the proposition up to the dealer has been sent every dealer in the country.

A survey by AUTOMOTIVE INDUSTRIES (Jan. 25, p. 105) found automobile factory executives extremely cool toward the plan. Mr. Frost believes, however, that final factory decisions with respect to attempting to put the plan into effect will depend upon how many of their dealers show interest in it.

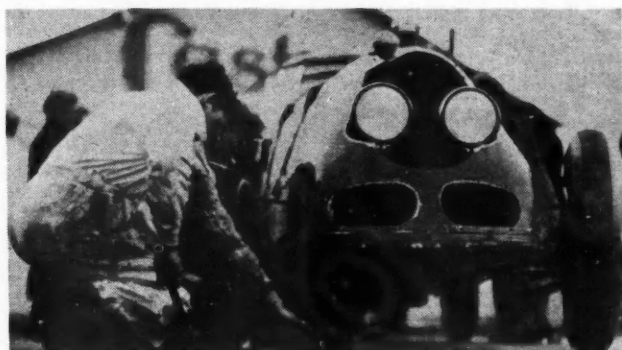
Roadbuilders Draw Plans for Spending Billion-Dollar Fund

The American Road Builders Association, at its annual convention and road show in Cleveland last week, drew up plans for the spending of a billion-dollar highway construction fund. The program includes building on a nationwide scale a system of farm-to-market roads with government aid in excess of the 45 per cent allowance from federal funds; construction of lateral highways around big cities, with improved arterial roads in metropolitan sections; an extensive program for new highway systems in the Northwest where road builders find present highways incapable of accommodating the increasing traffic.

The association took a firm stand against the diversion of gasoline tax funds for purposes other than road-building.

Safety measures took the lead in a discussion that followed a report by Frank J. McDevitt, streets director of St. Louis. The report, based on an analysis of traffic accidents in 22 major cities, recommended the adoption of legislation that would make driving while intoxicated a felony, and would make careless driving a more serious offense after dark than during daytime. Mr. McDevitt also recommended nationwide uniformity of traffic signals and signs, "building-in" safety in future road construction, and further education of the public in safe driving.

Domestic retail deliveries of the Buick Motor Co. during the second 10 days of January totaled 2374 units as compared with 1877 delivered in the first 10 days of the month and with 1137 in the corresponding period a year ago.



G. E. T. Eyston's oil-injection engined car with which he set seven world's records on the Montlhéry track near Paris, Jan. 4, 1936. These are the first records to be made in the new Diesel-type category established last May by the Commission Sportive Internationale. Mr. Eyston's highest speed was made in the 200 kilometer run when he averaged 103.22 miles an hour. His engine has 6 cylinders, bore 115 mm. (4.53 in.), stroke 146 mm. (5.75 in.), and piston displacement 9.09 liters (555 cu. in.).

40 Years Ago

—with the ancestors of
AUTOMOTIVE INDUSTRIES

Haynes and Apperson, Kokomo, Ind., will have a full line of motor-carriages in various styles ready at an early date.

The Duryea Motor Wagon Co. have leased the entire building in which their shop is located, and are making as rapid preparations as possible to meet the demand for the Duryea motor wagons.

English papers, writing on motor subjects, show a strange confusion of terminology. In one and the same article we find "horseless carriage," "motorcar," "self-propelled vehicle," and "automotor" used synonymously. Plenty of variety, surely, but not the right term yet.

—From *The Horseless Age*, February, 1896.

Michelin as Car Builder May Lose Tire Markets

Louis Renault, one of the leading automobile manufacturers of France, has ceased to equip his cars with Michelin tires, according to reports to the Department of Commerce from Paris. For many years Renault, like most French car builders, had bought his original tire equipment almost exclusively from Michelin.

When the Citroen automobile company got into financial difficulties last year, it was taken over by the tire manufacturer, who then became a direct competitor of his best customers. The Renault people felt that in continuing to deal with Michelin they were aiding one of their chief rivals, and decided to fill their tire requirements elsewhere in the future. Peugeot, third biggest French automobile manufacturer, is also expected to discontinue using Michelins in the near future.

N.L.R.B. Orders Election for Chrysler Designing Engineers

A secret ballot election within a period of 10 days from Jan. 25 will be held by order of the National Labor Relations Board in the plants of the Chrysler Corp. at Highland Park, Detroit and Hamtramck, Mich., to select representatives for collective bargaining between designing engineers and the company. Frank K. Bowen, regional director for the board at Detroit, is conducting the election.

Investigation of the facts regarding proper representation for the designing engineers in the Chrysler plants has been proceeding for several months under the direction of Mr. Bowen, the

N.L.R.B. states. The matter was originally presented to the Board on a petition filed by the Society of Designing Engineers. The board was requested to examine the contention of the Society that it represented a majority of the employees engaged in similar work at the Chrysler plants. The eligibility of those entitled to vote is limited by the board to the designing engineers on the payroll of the company on Jan. 25, and comprises body designers, including lead-off men, layout men, checkers, detailers and beginners; engineering designers, including checkers, layout men, detailers, beginners and tracers; and tool, special machine and die designers, including process engineers, checkers, layout men, detailers and beginners, in whatever office of the company they may be located, except such of the previously mentioned persons who have authority to hire or discharge.



Hugh J. Ferry, who has been appointed secretary-treasurer of the Packard Motor Car Co.

Sheet Steel Demand Still at Low Level

(Continued from page 141)

Middle West. Ordinary and cold-finished steel bars and automotive alloy steels, however, hold steady, and with commodities generally on the uptrend, the undercurrent of the steel market is more frequently interpreted in the market as denoting a recovery of what little ground has been lost in some descriptions of steel than a tendency to find adjustment on a lower basis at this stage of the economic ebb and tide.

Pig Iron—Demand from automotive foundries has eased off for the time being. Blast furnace shipments are much lighter than they were a month ago. Prices hold steady and unchanged.

Aluminum—Latest Dominion statistics indicate that Canadian exports of aluminum last year were approximately 60,000,000 lb., compared with 40,000,000 lb. in the preceding year and 73,000,000 lb. in the record year of 1929. The market is largely a routine affair with prices for both primary and secondary metal unchanged.

Copper—January sales are estimated at having been below 30,000 tons while in December they were close to 44,000 tons. The market is quiet and unchanged with electrolytic quoted at 9½ cents, delivered Connecticut point, both by producers and in the "outside" market.

Tin—What little change there has been in tin prices, resulted from the appreciation of the pound sterling in terms of the U. S. dollar. The London and Singapore metal exchanges were closed on Tuesday, because of King George's funeral. The week's opening price for spot Straits was 46¼ cents.

Lead—Demand is greatly improved, with storage battery manufacturers taking an important part of the tonnage that is being contracted for.

Zinc—Quiet and unchanged.

Geschelin to Speak

Joseph Geschelin, Detroit technical editor, AUTOMOTIVE INDUSTRIES, will address the Mallory Engineers Technical Association, Indianapolis, on Feb. 5. The subject will be "Behind the Scenes in Automobile Plants," a discussion centered about the development of new car models and the operation of the research organizations.

CALENDAR OF COMING EVENTS

SHOWS

Amsterdam, Netherlands, Automobile Show	Jan. 31-Feb. 9	France, Automobile Exhibit at Foire de Paris	May
Germany, Automobile Salon, Berlin, Feb. 15-March 1		Norway, Automobile Show, Oslo.....	May
Finland, Automobile Show, Helsinki.....	Feb. 25-March 1		
Austria, Automobile Show, Vienna, March 8-15			
Switzerland, Automobile Show, Geneva, March 20-29			
Hungary, Automobile Show, Budapest, Mar.-April			
Illinois Automotive Parts Assoc., Maintenance Exhibit, Navy Pier, Chicago, April 4-8			
Portugal, Automobile Show, Lisbon, begins April 16			
Yugoslavia, Automobile Show, Zagreb, May 2-11			
Spain, Automobile Show, Madrid, May 10-20			

CONVENTIONS AND MEETINGS

Assn. Highway Officials of No. Atlantic States, Atlantic City.....	Feb. 12-14
American Society for Testing Materials, Regional Meeting, Pittsburgh, March 4	
S.A.E. Tractor and Industrial Power Meeting, Milwaukee, Wis....	April 15-16
S.A.E. Production Meeting, Detroit, Mich.	April 21-24
U. S. Chamber of Commerce, Annual Meeting, Washington	April 27-30
American Petroleum Institute Mid-Year Meeting, Tulsa, Okla....	May 13-15
S.A.E. Summer Meeting, White Sulphur Springs, W. Va.	May 31-June 6
American Society for Testing Materials, Annual Meeting, Atlantic City, June 29-July 3	
American Society for Metals, 18th Nat'l Congress, Cleveland, O.....	Oct. 19-23

The Horizons of Business

by Joseph Stagg Lawrence

Business at the Crossroads

THERE are times when the economic skies are clear and the business portents certain. On such occasions the significance and certainty of coming events are apparent to many intelligent observers. As a consequence we have broad mass movements in speculation and business. The period from June to December, 1935, was such an occasion. The constructive elements of enterprise seemed emancipated by the Schechter decision. The markets foresaw and discounted in the form of higher prices the more satisfactory earnings of industry. Business and the security markets were characterized by an ebullience which found its origin in the conviction that business was free to make progress.

Politics and Business

It fully justified this confidence. An examination of American business during this seven months' period shows that it improved more rapidly than the broad tide of world business. Throughout 1934 it marked time and lagged while the volume of world activity as measured by the League of Nations index of production mounted upward. Parenthetically the lag of American business behind world volume in 1934 and its more rapid progress during the last half of 1935 proves that political conditions may at times affect, materially, the operation of orthodox economic forces. Our main point is that we have just come through a period of gratifying recovery.

From this point on the Delphic signs are less explicit. In terms of statistical probability the chances favor continued improvement. The pendulum has not yet swung so far as to demand compensation in the downward direction. If prospects are obscured, we must look again, as we did during 1934, to causes that are political rather than economic. This is true even though the surface manifestations may be economic.

For example, inflation has again raised its head. Inflation is a monetary phenomenon. Yet its authentic causes in this instance are clearly political.

We may classify inflations as necessitous or deliberate. History affords numerous examples of nations confronted by grave emergencies where statesmen had no other choice than coin-clipping or the printing press. The Federation of American Colonies which successfully resisted Great Britain, used printed negotiable promises to pay its bills. The infant nation was weak, its credit a gamble. It did not have the authority or power to collect taxes from its own citizens. Numerous writers, blatant in their pale virtue, have criticized Washington and the early fathers because they countenanced inflation. There was no other choice. A nation may borrow; it may tax. Failing these, it must prostitute the sovereign prerogative which remains, namely, the right to issue currency. This is necessitous inflation. Politics in the accepted sense has nothing to do with it.

Mounting Revenues

The American Government today is amply clothed with the authority required to collect taxes. The ability of its citizens to pay has increased year by year since the low point of the depression. It is estimated that the national income for 1935 is approximately 8 per cent greater than in 1934. This income is the final source of all taxes. Taxes may be based upon property. It might seem at first blush that a real estate tax, being levied upon land and buildings, is paid by these capital items. Actually the owner of the property must meet the charges from income. The tax gatherer will never accept the defense that the property upon which he has levied produced no income. In his books that has nothing, absolutely nothing, to do with the taxes which the owner must pay. The tax comes from the income of the owner. The property is used only as a convenient measuring device with which to determine the amount of the taxes which must be paid.

The tax-paying ability of the nation is excellent. The revenue figures of

the Treasury prove this. Counting both state and local units, the governments of the United States have collected more than \$10,000,000,000 during 1935. Thus the authority of government in this country is as unquestioned as the ability of its citizens to pay taxes is great. There is no warrant in the plain facts for necessitous inflation.

The Credit of the Government

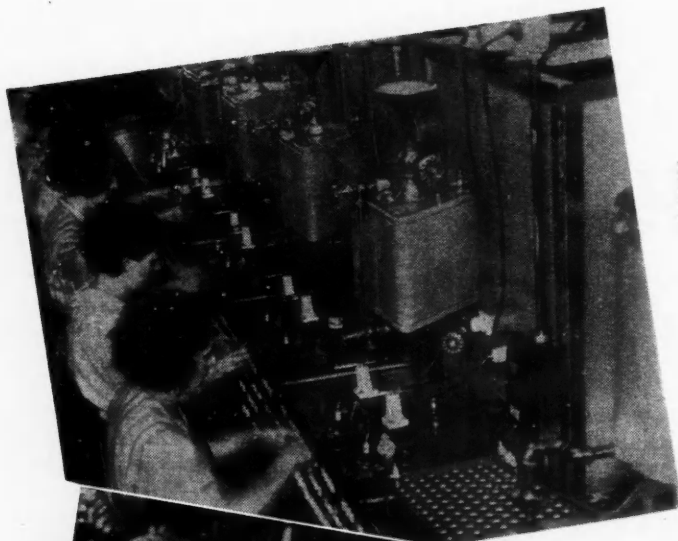
The precise credit and borrowing capacity of our Government are less clear, even though Mr. Morgenthau is able to borrow substantial sums at less than a quarter of one per cent interest. The fact is that the credit of the Government as a borrower and its sovereign right to issue currency are so commingled under our banking system that it is difficult to say whether the exceptional success of Mr. Morgenthau is due to the high credit of the Federal Government or to the facility with which it can issue and mask additions to our currency. When the Secretary of the Treasury "sells" the First National Bank of X a million dollars in bonds, are the proceeds derived from other accumulations of funds, or are they in fact a virgin creation of exchange power? If the latter, then the borrowings of the Government are merely insidious issues of currency whose special form is due to the character of our banking system. Competent students agree that there is no essential difference between credits created in a commercial bank against which the Government draws its checks and printed currency.

A New High

In spite of a substantial increase in regular revenue and the abatement of the emergency which might have justified unusual measures, the next deficit will touch a new peace-time high. Congress seems completely at the mercy of pressure groups, the bonus boys, the relief workers and the farmers. Is the present Administration disposed or able to deny the demands of insistent minorities? Will a change of administrations remove the leeches (Turn to page 152, please)

Improved Working Conditions Cut

By JOSEPH GESCHELIN



Dramatic test subjecting each spark plug to a charge of 25,000 volts directed at the insulator



NOT so long ago, we noted in *Automotive Industries* (December 7, Page 754) that the A. C. Spark Plug Co. had completed the largest plant expansion program in its history.

Outside observers, whether they be production-minded or not, can't fail to be impressed with what has been accomplished here—bright, fresh paint on ceilings and walls, new buildings, new equipment everywhere, and the orderly arrangement of manufacturing departments.

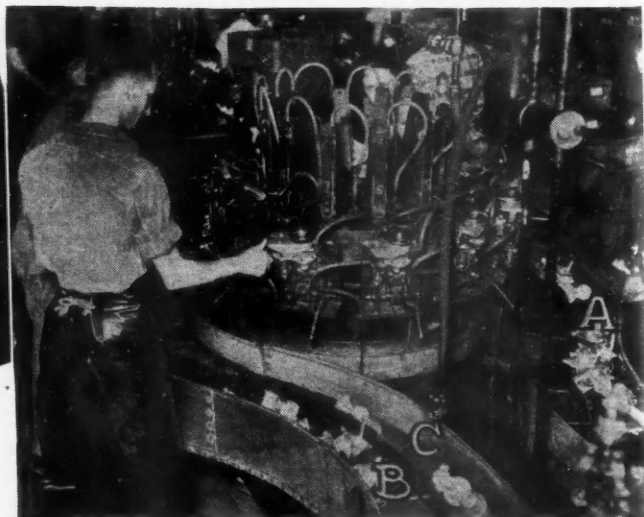
But back of all this is a breadth of vision and a depth of production lore that is not evident on the surface except to the trained factory executive. Here, for example, we find an unusual emphasis on comfortable working conditions and ventilation. Then there is a vast system of mechanized operations designed principally to facilitate materials handling and to relieve the operator of all responsibility except that of exercising his skill.

The ingenious system of conveyerizing has made it possible to build a greater volume of product within a smaller space, thus releasing much valuable floor space for worker comfort facilities. By eliminating most of the

(Lower left) Calibration and final adjustment of speedometers

Gas gages getting the final inspection

(Lower right) One of the inspection steps along the fuel pump line. Air-tested units come in on the line in the background, (A) are picked off the outer line in the foreground, (B) and fitted in the rotary prime testing fixture in the center. Those that pass the test are dropped on the inner line in the foreground (C)



Costs in New AC Plant

manual materials handling operations, the new layout has reduced the amount of stock in process, and thereby has facilitated and simplified the payment of earnings of production groups.

Introduction of modern production machinery and the generous use of safety appliances and guards at every point has eliminated physical fatigue on the part of the operators and has created an ideal setup for safe working conditions. That this is of more than academic value is borne out by the record made early this year of five months' no-accident operation with 4900 workers.

At AC, workers are paid according to group earnings, with everyone in a given line participating on the basis of daily output. There is no complexity in the matter of calculating earnings, since each production line is provided with a mechanical counter which records the flow of work. As a further means of simplification, inspection sta-

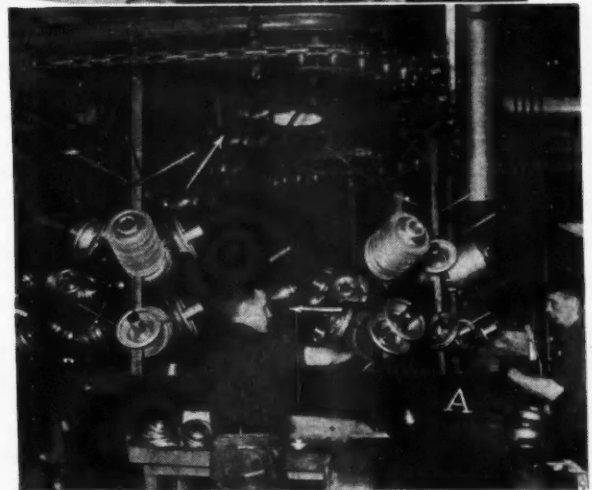
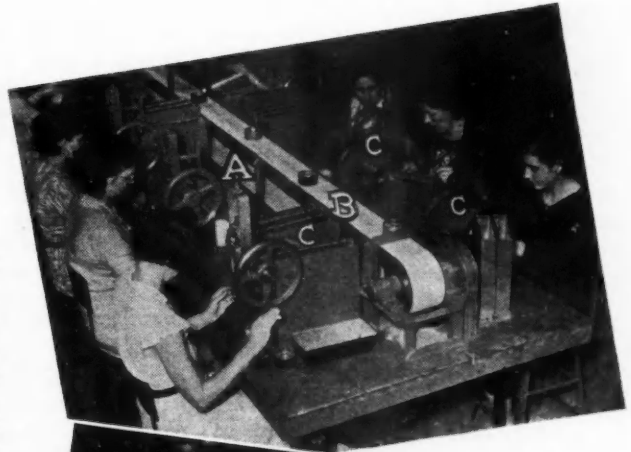
This preliminary operation on the gas gage line illustrates one application of motion study. The four hoppers in front of each operator (C) contain sufficient supply of small parts for day's run. These are assembled into sets, placed in small tins and carried to succeeding operations on the lower section (A) of the endless belt

Final steps in the production of silencers utilize three conveyor lines. The man in the background takes the units off the overhead line and places them on the table conveyor at his right (B) which moves the parts through the spraying and drying unit. The operator in the foreground assembles the trade mark label. The other operator removes the unit, inspects, and then lays it on the belt conveyor (C) in the foreground (at right angles to the other line)

(Left) Portion of spark plug assembly running 500 ft. in developed length. Operators at this end are adjusting the electrode gap

(Lower right) Parts for instrument panel assemblies come to the assembly stations in tiered trays (A). Finished panels are placed on the table-level belt (B) in the foreground

As silencer parts emerge from washing machine, they are fitted on the overhead rack conveyor (A) which carries them to an overhead drier



(Center) Double conveyor line for fuel pump assembly with pump bodies on the upper tier (B) and covers on the table level belt (A). Finished units are placed on the upper tier and picked off by inspectors



tions have been established at strategic points so that rejects are eliminated right at the source, and the final production count, therefore, represents the actual acceptable work.

We have it on the statement of Fred S. Kimmerling, AC president and general manager, that the introduction of new equipment has made it possible not only to improve working conditions, but also to improve costs to the point where the company is in a more favorable competitive position. This fact, together with a forward-looking policy of building certain standard items for stock has a decided bearing on the stabilization of employment, at least to a degree, during periods of normal seasonal decline.

Conveyorized operations at every turn represent the foremost examples of the art as it is known today. In the majority of applications, the conveyor has a two-fold function—not only does it carry the work to and away from the operator, but it serves also as the assembly station. Merry-go-rounds, multiple level belts, and other tricky mechanisms, some of which are illustrated here, are to be found in abundance.

Study of individual operations, probably the most potent tool available to management today, has found a place in the scheme of things at AC and has contributed largely in many places throughout the production lines. We do not have available the details of some of the interesting assembly stations which feature this study in its most entrancing form, but we can point to places along some of the assembly lines where the principle has been applied.

Since it is not possible to discuss this great operation in detail, we have selected two groups of illustrations in an effort to create some picture of this plant. The first group shows a random sample out of the host of inspection stations and testing or calibrating equipment. These are of more than passing interest, since they point so well to the painstaking care that is devoted to quality control. Here is assurance that the product will conform to specifications. (See page 150.)

In this group we have a dramatic test in which every spark plug is subjected to a charge of 25,000 volts intensity, aimed at the insulator. Next is a conveyorized inspection station—final inspection of gasoline gages. Conveyor blocks travel along the table in front of the inspector, carrying the finished gages. The empty return line will be seen moving along the center of the table in front of the inspector.

Every speedometer is accurately calibrated and adjusted before it reaches the shipping department. Another

precision test, typical of many similar operations, is that of testing fuel pumps. Each unit, as it comes off the assembly line, is air tested and then delivered to the prime test, on the rotary fixture in the center, on the conveyor line which winds around in the background. Fuel pumps are taken out at the station in the foreground, fitted in the rotary machine, and if they pass the test satisfactorily they are laid on the inner conveyor line in the foreground.

The second group of photographs is a small sample of the hundreds of unique conveyorized stations (see page 151). Unquestionably, the most spectacular of these is a section of the spark plug assembly conveyor which extends 500 ft. in developed length. In the foreground you see the operators setting the electrode gap. Another station—on the fuel pump assembly line—has two conveyor lines, the lower outer line carries the covers, while the upper tier carries the bodies. Operators remove the two units, assemble them in the quick-acting fixtures, and then place the finished assembly on the upper conveyor.

Consider the instrument panel line. Component parts travel on tiered racks over the work table, where they are picked off by the operators. Note the assembly stations, each equipped with high-speed tools, and provided with a day's supply of screws, washers, etc., within easy reach. After assembly, the panels are placed on the table level belt conveyor, which takes them to the inspectors.

An interesting and extremely com-

pact line has been developed for the silencer unit. Parts are delivered by chutes to a conveyor which drops them into the front end of a washer. At the outlet end of the washer, operators fit the parts on the rack of an overhead line which moves to the left and up through an overhead drier. Three conveyor lines are employed at the final stages of silencer assembly.

An excellent example of individual operation study applied to an assembly station is found in the preliminary operations along the gas gage line. Small parts for the assembly are stored in hoppers in front of each operator, picked out and processed, and then are placed in small tins which are sent along to the next operation on the lower section of an endless belt. The upper part of the belt is used to return the containers. Careful study was applied in determining the positioning of the containers as well as the relative location of component parts. The four hoppers at each station hold sufficient stock for a day's run. The assembly fixture is so designed that the operator enjoys a minimum of motions to do the job.

Adequate lighting has been used to supplement the painting scheme and contributes in no small measure to safety.

Thus we complete a very brief picture of the features of a production setup which exemplifies some of the latest ideas in planning and organization. It is an excellent commentary on the benefits of modern equipment, advanced manufacturing techniques, and management brains.

The Horizons of Business

(Continued from page 149)

from the public purse? The answer today is more uncertain than it has been at any time since the Government started to spend more than it collected. Inflation, political inflation, is one of the far-reaching conditions which obscures the true course of business.

The Election

A second condition is the election. The President's message to Congress, his speech at the Jackson Day dinner, the outspoken remarks of Al Smith at the Liberty League gathering in Washington, the invectives, more and more unqualified, which spokesmen on the two sides hurl at each other, all promise a campaign of unprecedented—at least in our times—bitterness. We once made a study of the effect which presidential election years had upon business and came to the conclusion

that they did not alter the fundamental trend—that business did just about what it would have done if there had been no election.

This precedent, we believe, does not apply to 1936. In no other election has the issue been so serious, the effects of victory by one side or the other so profoundly significant as in 1936. Time-tested institutions, the essential structure of American society, the principles upon which government in this country rests, are at stake. So wide a chasm has never separated the "ins" and the "outs" as yawns today between the party headed by the Administration—whatever its true name—and the party which seeks to oust it. The contemplation of this issue and the effects of victory by one side or the other will, we believe, influence the course of business.



P. H. MacGregor, general plant superintendent of Pontiac Motor Co., supervises the pouring of the first castings at the Pontiac foundry which was reopened recently after having been shut down since 1932. The plant has been completely modernized and reconstructed at a cost of \$500,000.

PRODUCTION LINES

Sludge OR

At the big T&M meeting in Detroit, several large operators advised that the sludge they are finding in truck engine crankcases today is not, in their opinion, sludge but an emulsion formed by water condensation in the crankcase. It is almost negligible in normal running and high speeds but is very troublesome on the jobs which require low-speed operation, frequent stops and starts, and particularly where the engine must be idled for a considerable part of the day. Two operators, in particular, have investigated this phenomenon and have found a solution in the use of oil filters of the water-absorbing type. They conclude that the diminution of sludging following the installation of this type of filter is evidence of the presence of water and its responsibility for the formation of emulsions.

Need Attention

Two projects which have been the subject of much activity in S.A.E. committees should be reopened pretty quickly. One is front wheel alignment, the other is gross vehicle weight ratings for motor trucks. Just when both projects were seemingly cleaned up, new developments have entered the picture. We shall be glad to tell you why further action is desirable.

Operation Study

One of the most valuable of the studies issued from time to time by the Policyholders Service Bureau is the bulletin entitled, "Operation Study," just off the press. It takes up briefly but comprehensively the current methods employed in this branch of management, including references to motion

study, time study, analysis, and process charts, several examples being given of the latter. Take our word for it, don't miss this one.

Cylinder Finish

Talking to Abbott the other day—he of the Profilograph—and he suggested the use of that instrument to settle the argument concerning the desirability of this or that kind of surface finish. The idea is that it's futile to talk about finishes unless you have some yardstick with which to measure them. The Profilograph offers a means of measuring surface finish in terms of mechanical units and its use should help to settle some of the prevailing questions.

Skid Chains

A representative of the Chain Institute made a plea, at one of the S.A.E. body sessions, for some consideration to clearances for the mounting of skid chains. He made the point that in certain parts of the country, chains are absolutely essential to safety and indeed are needed if one is to have any traction at all. He urged body designers to stretch clearances here and there so as to help the cause along and do their bit in the interest of safe driving.

Wider Sheets

We understand that one of the sheet rolling mills in this area will soon have the biggest continuous rolling mill in captivity. It will produce body sheets 79 in. wide.

Induced Heat

Comes word that induction heat is being used successfully in the heat treatment of bearing surfaces of crank-

shafts. One of the prominent crankshaft makers has put this technique into production and may describe it for us in an early issue.

Good Mileage

Bill Stout reports that on his recent run to the woolly west, the new Scarab showed an average fuel economy of 18.8 miles to the gallon. Understand that this represented some fancy driving as they covered 6000 miles in two weeks of driving and looking.

Casting Finish

Charles Pack, Doehler metals expert, told the boys at the production meeting that one of the coming developments in the die casting field will be the die-casting of cellulose-acetate finishes onto a die casting. This opens a fascinating field of investigation particularly for hardware producers.

Acoustics Lab

One of the prominent technical organizations who has always been associated with acoustical research is about to open a laboratory in Detroit. The lab is to have complete facilities for the investigation of sound-deadening, particularly. Its entire facilities will be at the disposal of automotive engineers, we believe without strings attached.

Turning Guides

We learn that one of the machinery experts has developed a unique set-up for finishing valve guides. It seems that they have found it possible to turn the O. D. with a certain grade of cemented-carbide that produces a surface comparable to grinding practice. You can't overlook this sort of one. —J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

G. M. Trucks Aim at Sales Peaks with New Powerplants and Rear Axle

LOWER prices and additional models are announced by General Motors Truck Corporation, Pontiac, Mich., for 1936. A great variety of mechanical options and of de luxe equipment features is being offered.

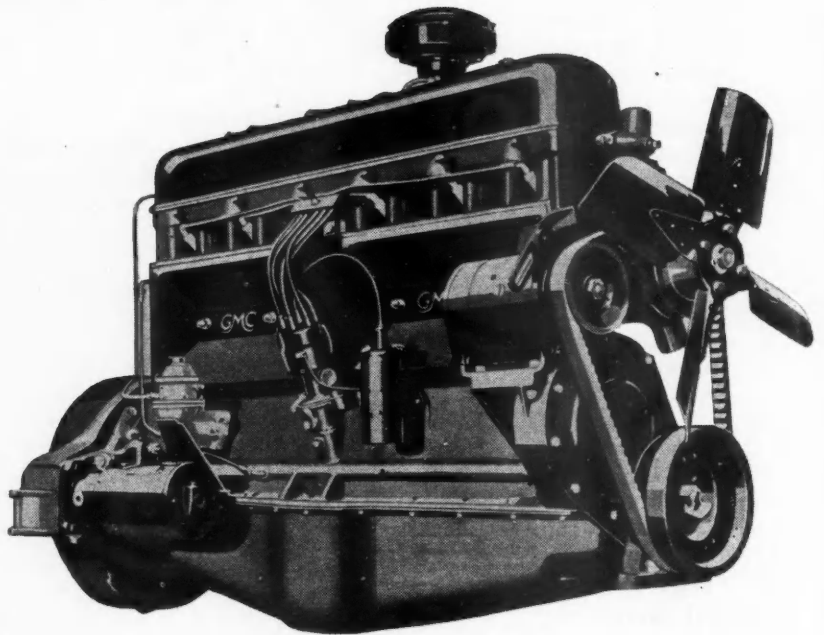
Perhaps the most striking thing about the 1936 GMC models is a new and distinctive tailoring of front-end sheet metal—cab, fenders, radiator, hood, etc.—which is uniform throughout the line. This new styling is intended to express the utility, strength, and massiveness of load-carrying vehicles.

The 1936 line leads off with the ½-ton Model T-14 with a base price of \$425. The group of three low-priced jobs—Model T-14, T-16, and T-16H—have the "213" powerplant used in the T-16 last year with some refinements. Three new engines with many important features for truck service are introduced with this line. T-18 and T-18H have the "239"; T-23 and T-23H have the "257"; and T-33 and T-33H have the "286" engines. The "331" and

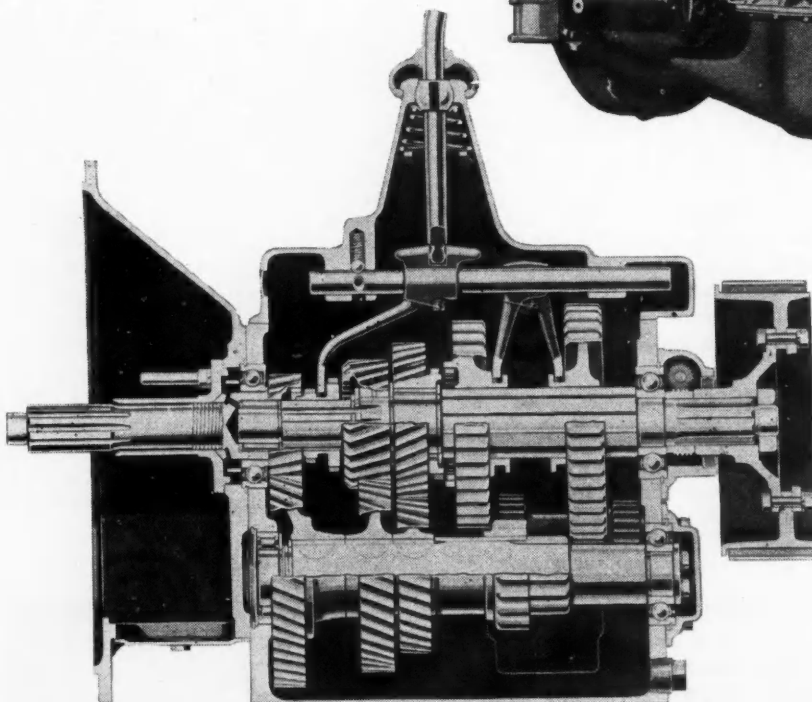
"400" series engines remain unchanged. Both the T-61 and T-61H, which have the "400" engine, may be fitted with the standard "450" at extra cost.

The "H" series models listed this year indicate companion models having the same chassis features but using the rear-end assembly—axle, springs, etc.—of the next larger model, thus increasing the load-carrying capacity.

All models in the line, except the T-14, T-16 and T-16H, now have set-back front axles, thus offering standard S.A.E. loading spaces with shorter wheelbases. Dual performance rear axles are available at extra cost on models T-16 to T-46 inclusive. These axles provide increased pull in the low-range and higher running speed in the high-range positions.

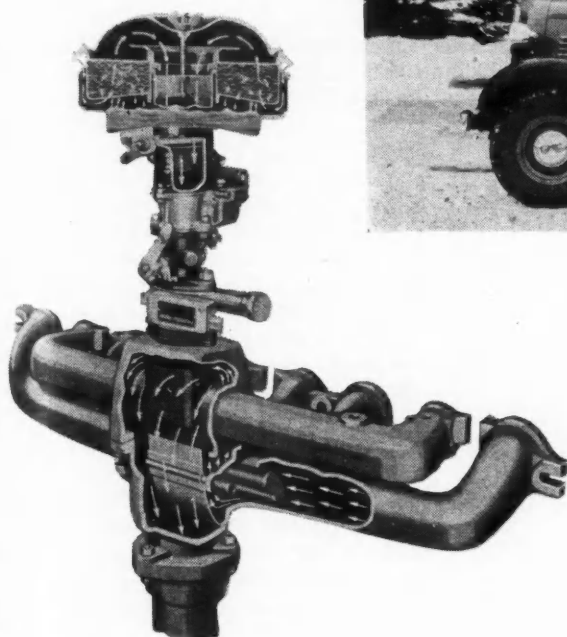


New GMC 239-cu. in. valve-in-head engine



Standard five-speed transmission of Model T-46

h 1936 Styling, e Construction



New GMC 1/2-ton panel delivery wagon

Downdraft carburetor, showing oil-bath air cleaner and automatic heat control of 239-, 257- and 286-cu. in. engines

Improved brakes are a feature of all models. Hydraulic brakes are found on the lighter jobs, T-14 to T-18H inclusive; hydraulic brakes with vacuum power on T-23 to T-46 inclusive, and air brakes on the T-61 and T-61H.

Governors are standard equipment on all models from T-18 up. The new Leibing gas-velocity governor has been adopted for models T-18 to T-33H inclusive, while the Handy governor is continued on T-46, T-61 and T-61H.

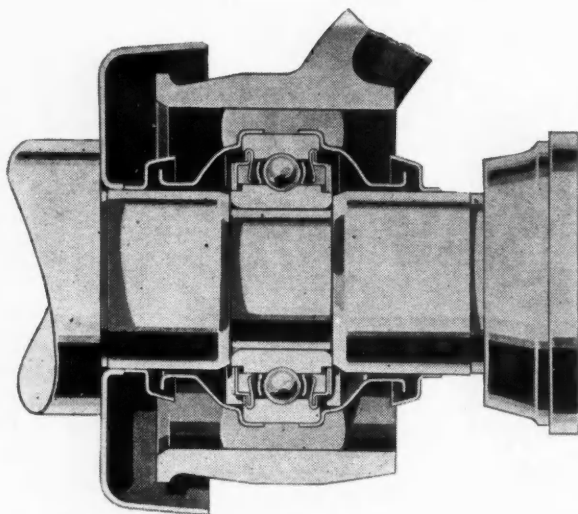
A new rubber-encased, propeller-shaft center bearing is now a regular feature of every model in the line above T-14. The heart of this unit is a permanently greased and sealed self-aligning ball bearing mounted in a rubber ring. The rubber mounting prevents transmission of axle and transmission noises and at the same time is said to produce a trouble-free job which does not require lubrication or inspection during the life of the vehicle.

Another feature common to light-

GMC Conventional Models Comparison 1935-1936

1935				1936			
Model	Ton Range	Engine	Base Price	Model	Ton Range	Engine	Base Price
T-16	1½-2	213	\$ 595	T-14	½	213	\$ 425
T-18	2-3	221	777	†T-16	1½-3	213	525
T-23	2½-3½	221	1115	†T-16H	1½-3½	213	645
T-33	3-4½	257	1655	†*T-18	1½-4	239	815
T-43	3½-5	257	1795	†*T-18H	1½-4½	239	895
T-46	4-5½	331	2285	†*T-23	2-4½	257	1285
T-46H	5-6½	331	2625	†*T-23H	2-5	257	1515
*T-51	4-5½	331	2925	†*T-33	2½-6	286	1785
*T-51W	5-6½	331	3095	†*T-33H	2½-6½	286	2135
*T-51H	5-6½	331	3295	*T-46	3½-7	331	2485
*T-61	5-6½	400	4395	*T-61	4-8	400	4835
*T-83	6-8	400	5185	*T-61H	5-10	400	5175
*T-84	7-10	450	5760	†Dual performance rear axle at extra cost.			

*Set back front axle.



Rubber-encased
center bearing

and medium-duty models is the rear-axle flange stud construction, in which all of the studs transmitting torque are fitted with tapered dowels. This is said to make a permanent connection and to eliminate trouble at this point.

Buyers are offered a choice of 12 colors for their color scheme on any model without extra cost. In addition, there is a special choice of seven de luxe color combinations on any model which specifies any of the de luxe options. This, too, is at no extra cost to the buyer.

Following is a brief résumé of engine specifications and of the special features of the new powerplants. The "213" is an L-head, six-cylinder of 3 5/16-in. bore by 4 1/4-in. stroke (213.3 cu. in. displacement). It is rated 84 hp. at 3500 r.p.m., and produces a maximum torque of 152 lb.-ft. at 1200-2500 r.p.m.

The "239" engine is a valve-in-head six-cylinder of 3 5/16 in. bore by 4 1/4-in. stroke (238.9 cu. in. displacement), and is rated at 81 hp. at 3000 r.p.m. governed speed. Its maximum torque is 170 lb.-ft. at 1000-2000 r.p.m.

The "257" engine is a valve-in-head six-cylinder of 3 7/16-in. bore by 4 1/4-in. stroke (257.5 cu. in. displacement) and is rated at 87.5 hp. at 2800 r.p.m. governed speed. Its maximum torque is 190 lb.-ft. at 800-1600 r.p.m.

The "286" engine is a valve-in-head six-cylinder of 3 5/8-in. bore by 4 1/4-in. stroke (286.4 cu. in. displacement), and is rated at 90 hp. at 2600 r.p.m. governed speed. Its maximum torque is 205 lb.-ft. at 1000-1800 r.p.m.

The "239," "257," and "286" engines are new models, all of which have full-pressure lubrication with rifle-drilled connecting rods, an oil filter, an oil-bath air cleaner of the self-washing type, a heavy crankshaft with integrally forged counterweights and external torsional balancer, heat-treated alumi-

num pistons with floating piston pins, alloy inserts for the exhaust valves, automatic heat control for the inlet manifold, with a control valve which deflects the exhaust gases around the intake during the warming-up period; a packless water pump with a spring-controlled carbon ring replacing the usual packing and adjusting nut, and a 100-watt generator with forced cooling.

The "331" and "400" engines which remain unchanged are both of the six-cylinder valve-in-head type. The "331" develops 94 hp. at 2500 r.p.m. governed speed, and 230 lb.-ft. torque at 800-1400 r.p.m. The "400" develops 110 hp. at 2300 r.p.m. governed speed and 296 lb.-ft. torque at 800-1600 r.p.m. Both have Stellite-faced exhaust valve seats.

Following is a brief list of special chassis features of the various models. T-14—126-in. wheelbase, nominal length of body back of cab, 7 ft.; synchromesh three-speed transmission, semi-floating rear axle with torque tube drive. GMR hydraulic brakes, with 168 sq. in. lining area, worm-and-ball bearing sector steering gear.

T-16—Wheelbases of 131 and 157 in. for 9 and 12 ft. maximum body length back of cab; GMR hydraulic brakes

with 337 sq. in. lining area; heavy-duty, four-speed transmission mounted on ball and roller bearings; full-floating rear axle with spiral bevel drive and straddle-mounted pinion; steering gear of roller-bearing worm type.

T-16H—Wheelbases of 139 1/2, 163 1/2, 181 1/2. Same features as T-16 except use of T-18 rear axle, springs, and brakes.

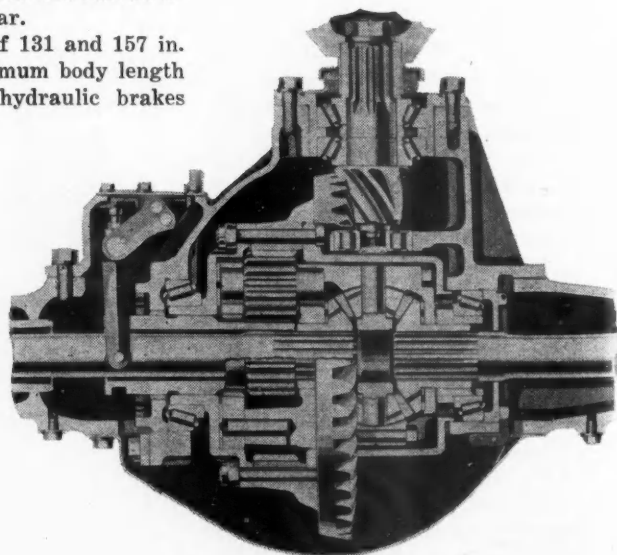
T-18—Wheelbases of 136, 160, 178 in. Clutch is now 11 in. in diameter with ball throwout bearing. Larger steering gear with 18 to 1 ratio, heavier frame with deeper side rails, are improvements over the previous model.

T-18H—This model incorporates all the features of the T-18, combined with the T-23 rear axle, rear brakes, and springs. Wheelbase range same as T-18.

T-23—Wheelbases of 136, 160, 178, 196 in. Clutch is 12 in. single disc, non-shock loading forced pressure having a large number of clutch release fingers equally spaced around the pressure plate. When disengaged, the fingers lean forward and any tendency to engage, while the engine is racing, creates a strong centrifugal force tending to move the finger farther forward, and out of engagement. After engagement, the inner ends of the fingers are inclined to the rear of the unit and as truck speed increases, centrifugal force tends to push the fingers farther back, thus increasing the pressure of the disc in proportion to the driving torque. This type of clutch, except for size, is used on all models from T-23 up. Brakes are hydraulic with vacuum power, 342 sq. in. lining area. Heavy-duty, four-speed transmission with constant mesh, helical gears, full-floating rear axle.

T-23H—This is similar to the T-23, except for the rear-end assembly which is the same as on T-33.

Sectional view of
dual-performance
rear axle which
is optional on
some models

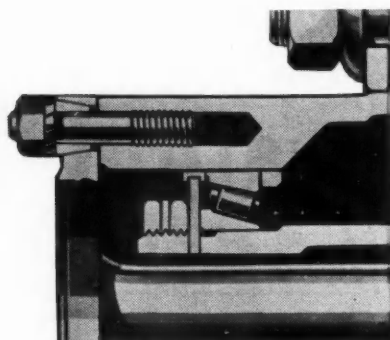


T-33—Wheelbases of 136, 160, 178, 196 in. Brakes are hydraulic, with vacuum power. Air-operated Timken brakes with adjustable levers are optional at extra cost. Full-floating rear axle, four-speed, heavy-duty, constant-mesh, helical-gear transmission, non-shock loading, forced pressure type clutch.

T-33H—This is similar to the T-33 but combines its features with the rear-end assembly of the T-46.

T-46—Wheelbases of 136, 160, 178, 190 in. The standard engine is the "331" and incorporates a 13-in. clutch. A five-speed underdrive transmission with constant mesh helical gears is standard, a five-speed overdrive transmission with silent third and overdrive is optional at extra cost. Hydraulic brakes with vacuum power are standard, air brakes available at extra cost.

The T-46 is also available with the



Showing use of taper dowels on bolts connecting axle drive flange to wheel hub

"400" engine option, which includes the larger engine, a 14-in. clutch, and the next larger five-speed overdrive or underdrive transmissions, a larger radi-

ator core and a larger driveshaft.

T-61—Wheelbases of 136, 160, 178, 196 in. Air brakes are standard—Westinghouse at the rear with slack adjusters, Timken at the front with adjustable levers. The clutch is of 14-in. size. A variety of transmission options is offered. The heavy-duty, five-speed overdrive transmission is standard, while the five-speed underdrive is optional. In addition, a combination of a four-speed transmission with a three-speed, constant-mesh helical gear auxiliary transmission is available for heavy-duty work where 12 forward speeds may be desirable. The full-floating, double-reduction axle is standard.

T-61H—This is similar to the T-61 except for larger rear springs and heavier double-reduction axle as standard equipment. Both the T-61 and T61H are offered with the "450" powerplant option.

Streamlining Reduces Air Resistance 30 Per Cent

STREAMLINING as applied to modern automobiles does reduce the air resistance, the improvement being of the order of 30 per cent. This conclusion may be drawn from a report on "Air Resistance of Motor Vehicles" presented at the recent annual meeting of the Highway Research Board by L. E. Conrad and E. R. Dawley of Kansas State College.

With the assistance of the Bureau of Public Roads, a wind tunnel of a size sufficiently large to test full-size cars was built at Kansas State College about a decade ago, and the tests on which the report is based were made in this tunnel. Originally the fans of the wind tunnel were driven by two 55-hp. electric motors, but for these tests a Liberty aircraft engine was installed. This permitted of producing an air speed of 50 m.p.h. in the tunnel, whereas with the electric motors 40 m.p.h. was the limit. The report includes a table giving test results on 54 different automobiles. The table gives the name, body model and year of manufacture of the car, its projected area, total resistance at 50 m.p.h., unit resistance at this speed, hp. required to overcome the wind resistance at this speed, the general and the conventional resistance formulas with the constants applying to each particular car, and remarks on the equipment of the cars.

The general air-resistance formula is

$$P = K' A V^n$$

where K' is a coefficient; A , the forwardly projected area in sq. ft., and V , the car speed in m.p.h. When this formula was applied to the test results

from the 54 cars, the values of the exponent n varied between 1.87 and 2.20. The average value was 2.025, so that according to these tests the wind resistance on the average varies very nearly as the second power of the speed. The convention formula is

$$P = K A V^2;$$

when this formula was applied to the test results, the value of the air-resistance coefficient K varied between 0.00156 and 0.00202, the average value being 0.001785. With one exception all of the cars tested at that time were models built prior to 1933. These coefficients seem very low, considering that they apply to cars built before the present move toward streamlining was inaugurated. The lowest coefficient, 0.00156, was obtained with a Buick 1932 coupe.

Checking tests were made by determining the speeds at which the cars would coast down a hill of uniform grade at a constant speed. From experiments on three cars it was found that the rolling resistance between 10 and 60 m.p.h. can be quite accurately expressed by the equation

$$R = 0.16V + 23.70 \text{ (lb. per 1000).}$$

By making tests on two grades of different slope and inserting the uniform coasting speeds in an equation, values were found for the product of the air-resistance coefficient by the projected area. Coasting tests must be made at times when there is no appreciable wind, and also when there is little traffic on the road, and it was found that these conditions could be met best

at night. Coasting tests were made with two of the cars which had been tested in the tunnel, the Buick 1929 sedan and the Austin 1930 coupe. Tests with the former gave a value of 0.0018 for the air-resistance coefficient, as compared with 0.00185 determined by the wind-tunnel tests, while coasting tests of the Austin gave 0.0018, as compared with 0.00169 obtained from the wind-tunnel tests. It is believed that in the case of the Austin either the bearings were not in good condition, or else there was some brake drag which would account for the discrepancy between the results of the wind-tunnel and coasting tests. These factors must be guarded against when making coasting tests.

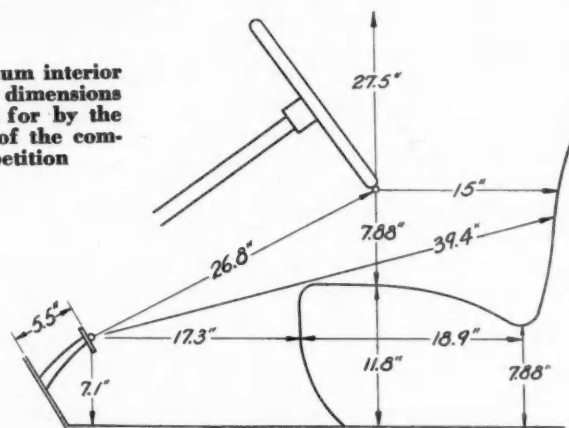
Additional coasting tests were recently run on two well-streamlined cars, a 1934 Studebaker five-passenger four-door sedan with built-in trunk and spare tire, and a De Soto Airflow 1934 six-passenger four-door sedan with spare tire. These tests were run on four grades, varying from 1.67 to 7 per cent. The average value of KA (air-resistance coefficient times projected area), corrected to 29 in. barometer and 70 deg. F., was 0.0337 for the Studebaker and 0.0346 for the De Soto. The projected area was 27 sq. ft. in each case, so the air-resistance coefficient was 0.00125 for the Studebaker and 0.00128 for the De Soto. By comparing these values with the average obtained in the wind tunnel tests, viz., 0.001785, it will be seen that in these modern streamlined cars the air-resistance has been reduced 30 per cent and 28 per cent respectively.

Design Innovations Unearthed

REFERENCE has been made repeatedly in these columns to the competition organized by the French Society of Automobile Engineers for designs for a low-priced two-passenger car to be known as the S.I.A. The official regulations of this competition have just been issued. In a "preamble" it is stated that it is a commonplace to point out that the French automobile industry is passing through a crisis at the present time. It is much better to look for ways and means of getting out of the depression.

One obvious way would be to produce more, as the crisis would then take care of itself; but before it is possible to produce more it is necessary to sell more, and the whole problem revolves around this point.

Minimum interior body dimensions called for by the rules of the competition



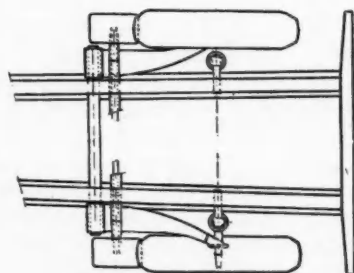
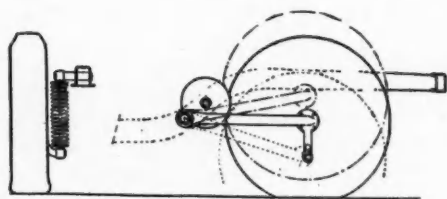
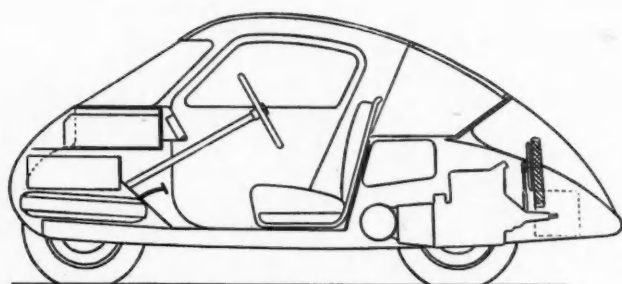
The lowest-priced French car at the present time costs about 15,000 francs

(\$990), and its operating cost is not less than \$33 per month. These cost figures render the present-day automobile inaccessible to the majority of the French population. There can be no doubt that if it were possible to place on the market a vehicle costing not to exceed 8000 francs (\$528) and which could be kept in operation at between 250 and 300 francs per month (\$16.50-\$20), an entirely new market would be opened up. An immediate result would be a greatly increased diffusion of the automobile, and the social repercussions of this development could not fail to have a very important and favorable effect on the return of prosperity.

A vehicle of this type is evidently quite difficult to produce. Many have thought of it, but no one has as yet produced such a car commercially. It is for this reason that it occurred to the Society of Automobile Engineers, whose membership comprises the best technical brains of the French automobile industry, to contribute its mite toward the solution of the problem. The program which it has set up for itself may be briefly summarized as follows:

To lay down the general outline for a two-passenger, very comfortable vehicle capable of a maximum speed of 75 km. (47.5 miles) per hour on the level, having a fuel consumption not to exceed 5 liters per 100 km. (46.5 miles per U. S. gallon), and selling at not over 8000 francs (\$528).

It will be seen that some sacrifice has

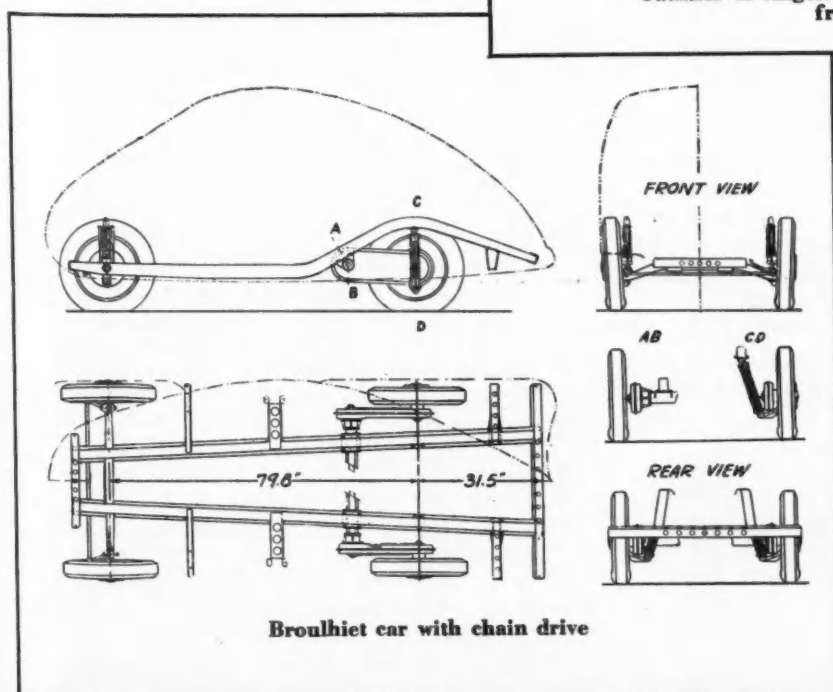
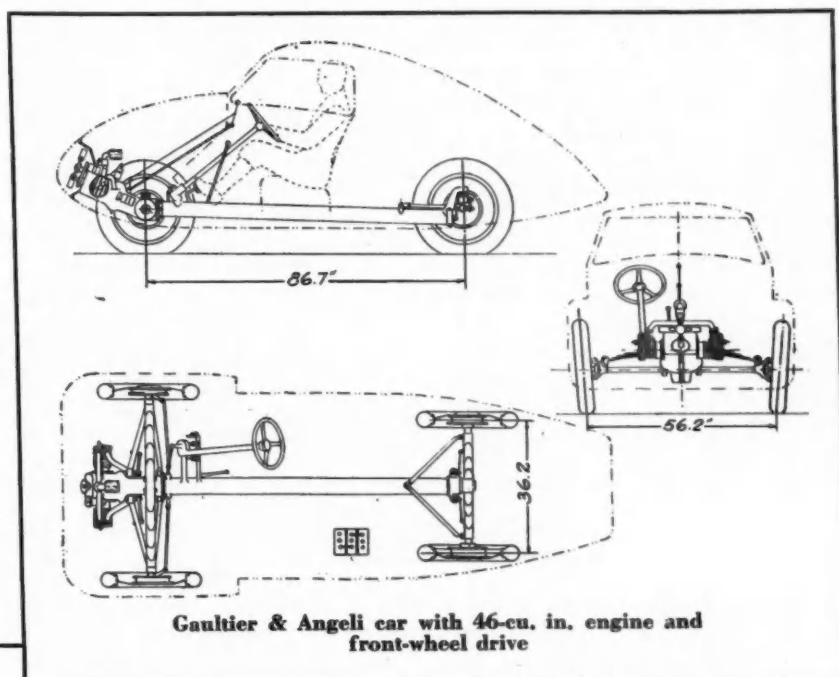


Broulhiet car with rear-mounted engine and drive by two pneumatic friction rollers

Competition of French Society of Automobile Engineers brings out many new ideas in automobile layout for a low-cost two-seater.

been made in the matter of speed (which is not the principal consideration of the class of buyers which it is planned to interest in this vehicle) in order to achieve important gains in fuel economy. The number of passengers has been strictly limited to two, in order to permit of an important reduction in weight and in the cost of production.

The part which the Society of Automobile Engineers plans to play in the creation of the S.I.A. vehicle is also defined in the "Preamble." There can be no question of the society getting up complete designs, much less of its entering upon the manufacture of a vehicle of this type. All that it hopes



to do is to stimulate thought on the subject, and to encourage the production of rough plans, and even more advanced projects, the presentation of which, it is hoped, will make it easier for some automobile manufacturer to market a vehicle of this kind.

The society is in possession of a considerable sum of money with which to encourage and reward its members, by the award of suitable prizes, for meritorious work done on the problem. A sum of 200,000 francs was placed at its disposal by the Automobile Accessories Manufacturers Association, from which the first awards may be made. It is hoped, moreover, that the generosity of automobile manufacturers, of parts and accessories manufacturers, and of all those who devote their energies to the development of the automobile will per-

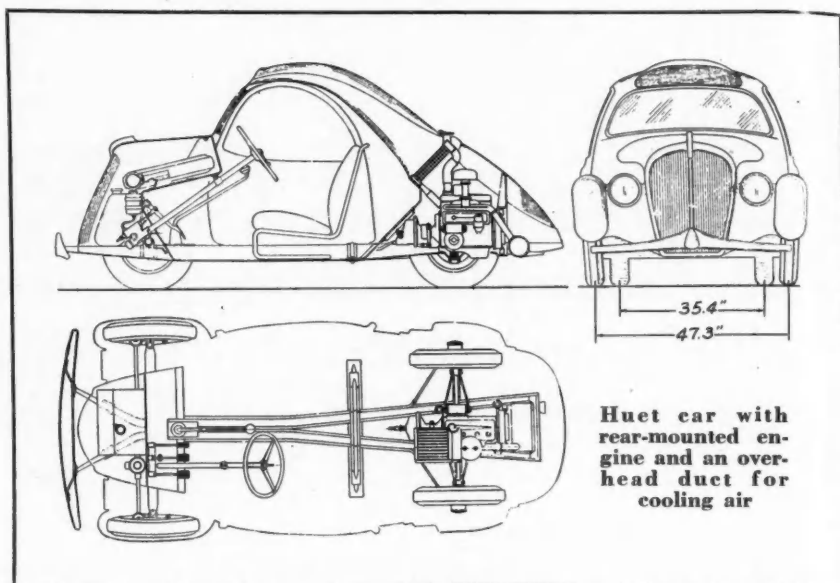
mit of an extension of the budget devoted to this undertaking.

The Society of Automobile Engineers will receive projects or suggestions, will examine them, and will decide on the award of prizes and on the amount of these prizes, for those entries which it considers most meritorious.

It is foreseen that the competition will draw much criticism from the automobile world and probably also from outsiders. Far from dreading such criticism, the society actually solicits it. If the criticism offered permits of improving on the original program, it will be greatly appreciated. This program is not pretended to have attained perfection at the very beginning. It has the merit of being a program conceived in good faith, due to and addressed to men of good will and who profess this good will by action.

Following is a brief review of some of the "projects" or designs submitted for the competition (from *Motor Italia*).

The design of G. Brouhiet provides for a four-cylinder engine of conven-

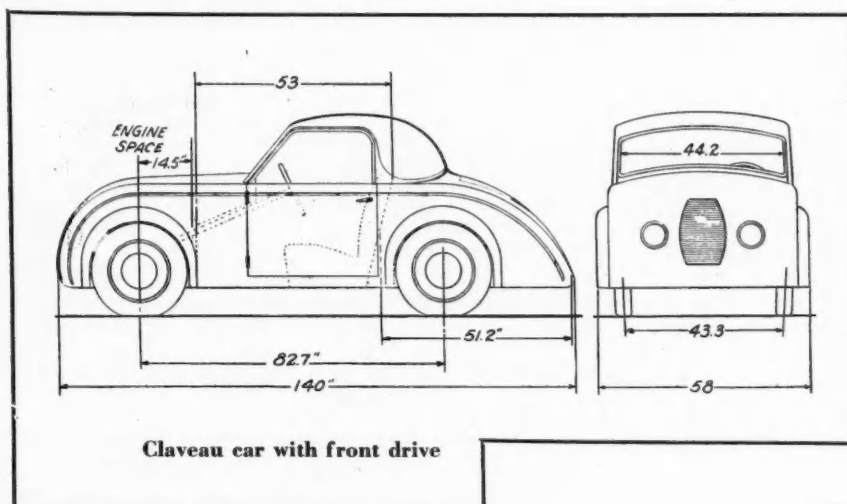


Huet car with rear-mounted engine and an over-head duct for cooling air

while with a full load it is expected to weigh 1430 lb. In the second project of the same competitor the transmission is

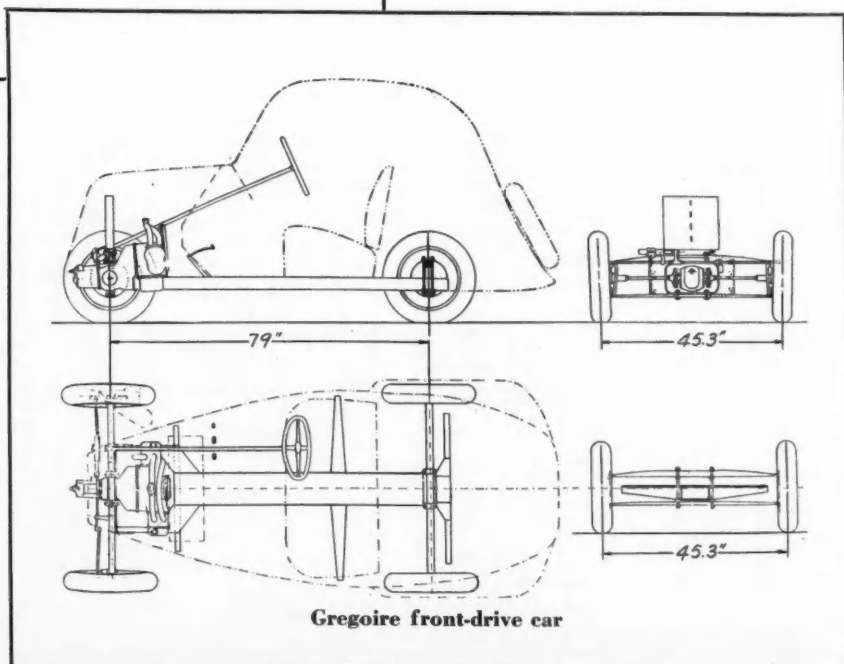
by chain. The chain housings form the supporting arms for the rear-wheel spindles. All dimensions are the same as in the first project, except that the rear tread is increased to the same width as the front tread—43.3 in. The estimated weight also is increased by some 20 lb., to just over 1000 lb. This car has a minimum turning radius of 12 ft.

One criticism that has been raised against the Brouhiet design is that with an engine at the rear it is difficult to provide for effective cooling. The windshield, which is at a considerable distance from the eyes of the operator, is to be made of cellon sheet, but it has been pointed out that this material



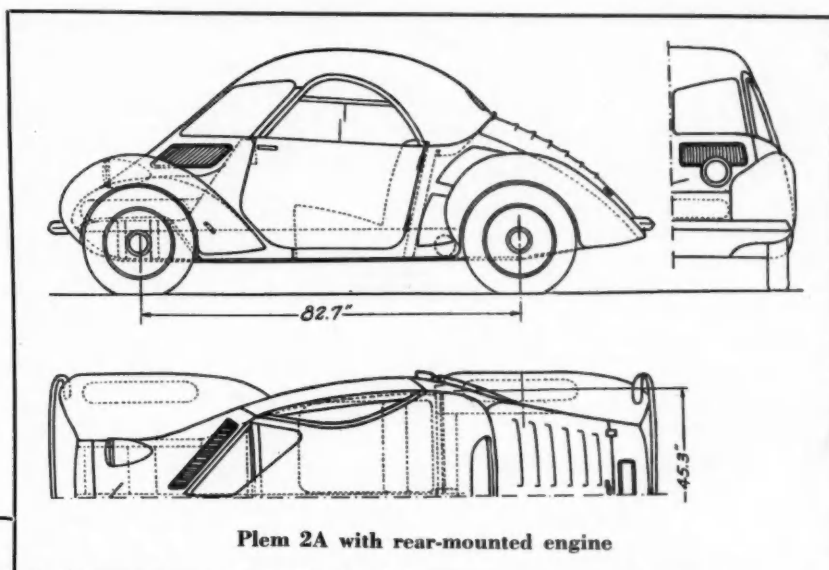
Claveau car with front drive

tional design and located back of the seat. M. Brouhiet really submitted two alternate projects. In the first of these the final drive is by pneumatic rollers in frictional engagement with the rear-wheel tires. All four wheels have independent suspension. The springing at the front is of the same general type as that long used on Lancia cars, while at the rear the suspension is by cranks swinging in longitudinal vertical planes and pivoted at opposite ends of a rigid cross member of the frame. Spare wheel and baggage are carried in the extreme forward end of the vehicle. The wheelbase is 78 3/4 in., the tread of the front wheels 43.3 in., and the tread of the rear wheels, 35.5 in. Unladen the vehicle is estimated to weigh 990 lb.,

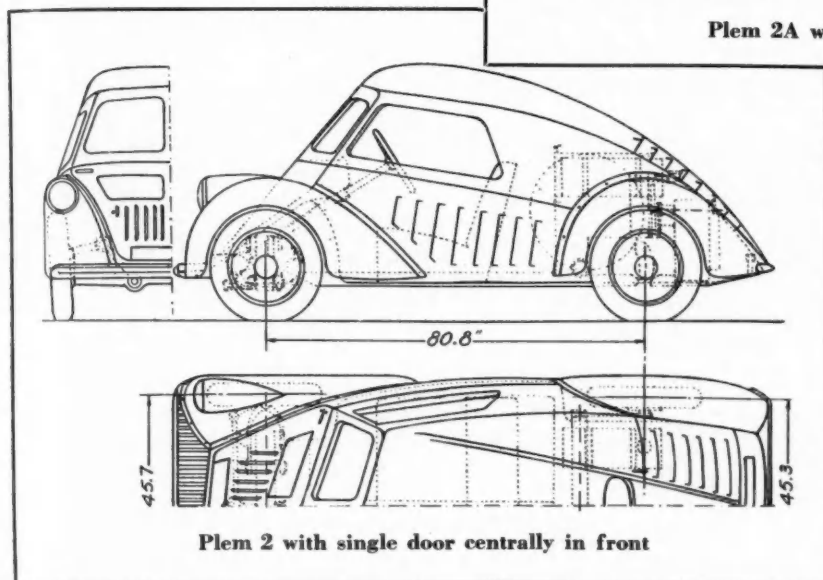


Gregoire front-drive car

soon loses its transparency and is therefore unsuitable for the purpose. These slight defects can be readily remedied, however, by slight changes in the forward portion of the car. As regards the engine cooling problem, the provision of generous baffles and a powerful fan evidently would take care of that. Many, no doubt, will view the final drive by means of pneumatic rollers with skepticism, and it was to meet criticism on this score that the inventor presented his second project, with chain drive. In the latter the chain evidently would have to be relatively short, otherwise the chain case would not have sufficient tor-



Plem 2A with rear-mounted engine



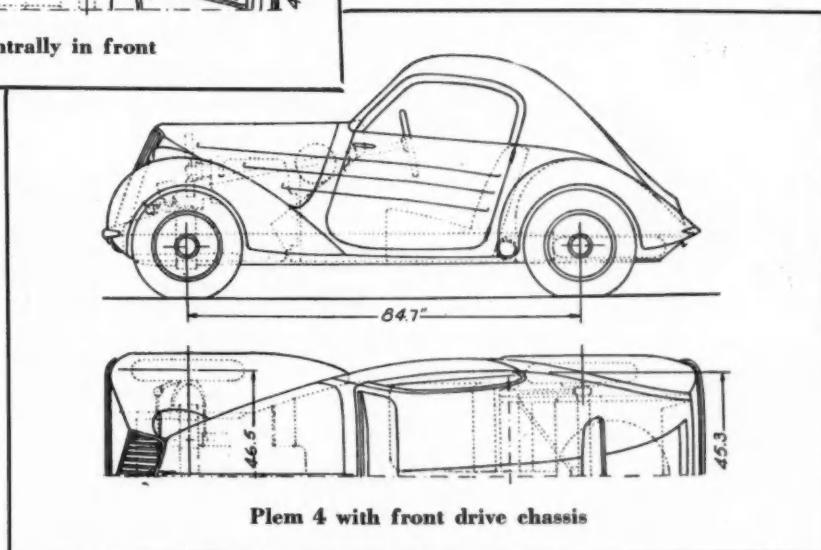
Plem 2 with single door centrally in front

ing frame construction and a vent or flue extending along the top and down the back of the body, for cooling air to the radiator. How the drive is to be effected is not plain from the drawings. The engine is a four-cylinder one of 20 hp., the weight of the unladen car is 925 lb., and the maximum speed 53 m.p.h.

Claveau, who built several cars with

sional stiffness to carry the load on it.

An attractive project is that due to Messrs. Gaultier and Angeli. It has a backbone frame construction, independent suspension for all four wheels, front drive, and a front-mounted powerplant ahead of the final drive and with only two cylinders—air-cooled. The displacement is 46 cu. in. and the engine is said to deliver 13 hp. The weight of the unladen vehicle is only 660 lb. With a load of 460 lb. the laden weight therefore comes to little more than 1100 lb., this total including 330 lb. for the passengers, 88 lb. for the suit cases, 31 lb. for 3 3/4 gals. of gasoline, and 13 lb. for tools. A well-streamlined body is provided for. The maximum speed is estimated at 64 m.p.h., and it is figured that on the road circuit of Montlhery the car can maintain an average of 43.5 m.p.h. The fuel mileage is expected to work out to 52 per U. S. gallon. On a grade of 5 per cent the car can maintain a steady speed of 43.5 m.p.h.; on a 10 per cent grade, 30 m.p.h.; and on a 20 per cent grade, 16.7 m.p.h. It is said

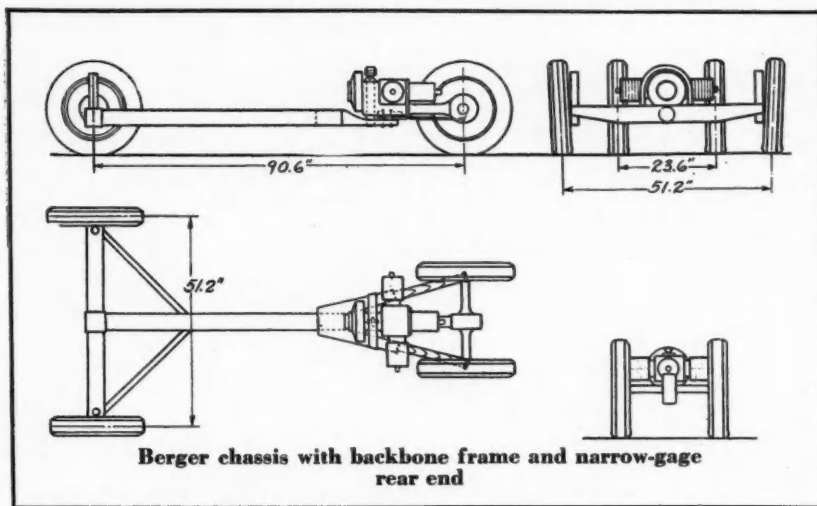


Plem 4 with front drive chassis

to be possible to start the car on an upgrade of 35 per cent. The outstanding features of this car are its extreme lightness and its excellent streamlining.

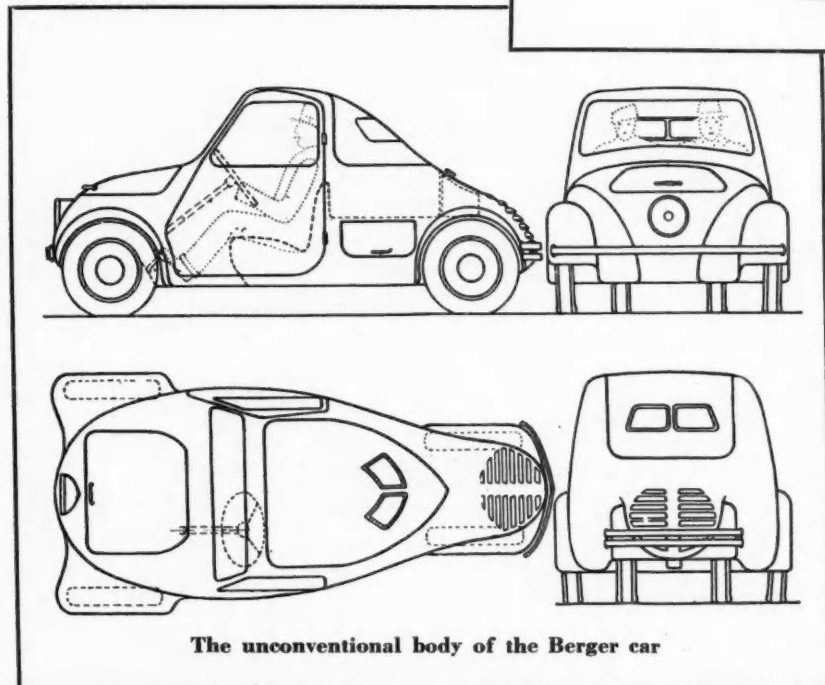
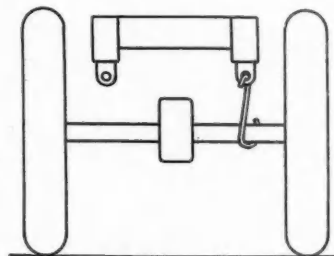
M. Huet proposes a vehicle with a rear-mounted powerplant, the wheelbase of which is only 75 in. This is substantially the same as that of the Baby Austin. The Huet car has an interest-

streamlined bodies quite a few years ago, could hardly fail to take part in this competition. His earliest unconventional cars were equipped with rear-mounted engines, while later he switched over to front-mounted engines and front drive. The design entered by him in the competition shows an unusually compact powerplant with front



drive. The engine is a four-cylinder one of a new type, with air-cooling. The weight of the unladen car is 990 lb. and the maximum speed, 56 m.p.h.

M. Berger's method of eliminating the need for a spare tire. In case of a rear-tire puncture the hook supports the axle end

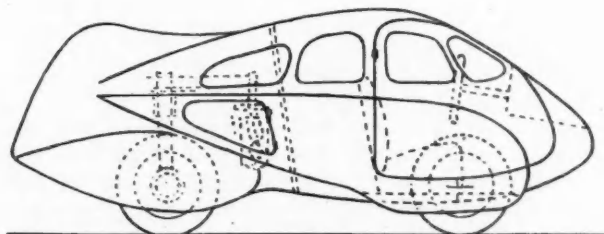


M. Maurice Berger, secretary of the S.I.A., also participates in the competition. The Berger design has four road wheels, but the tread at the rear is only about one-half the front tread, the object of the narrow rear tread (24 in.) being to do away with both a differential gear and with universal joints. It will be seen that the powerplant has a pivotal mounting and oscillates around its pivot axis with the action of the rear springs. Another feature of this design is that the spare wheel is eliminated. If a wheel has to be changed because of a

J. E. Gregoire proposes a vehicle with engine and transmission mounted at the front. While the design shows a two-cylinder engine, the substitution of a four-cylinder could readily be provided for. The suspension is independent both front and rear. The frame is of the backbone type, with a single central carrying member of rectangular section.

M. Plem entered no fewer than three different designs in the competition. The first provides for a 20-hp. engine and

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Ultra-streamlined three-wheeled car of de Monge and Janin

puncture or other tire defect, one of the two rear wheels is used for the purpose, after the axle on that side has first been secured to the chassis.

M. L. Mutti has entered a front-drive design, with a three-cylinder radial engine. The cylinders are arranged horizontally around a crankcase mounted on top of the transmission and drive housings. In an alternate design the engine sets over the front axle, at a slight inclination to the vertical, the drive being to a transmission back of the front axle and thence to the final drive gear below the engine.

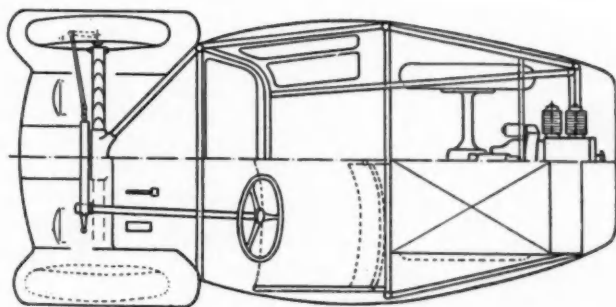
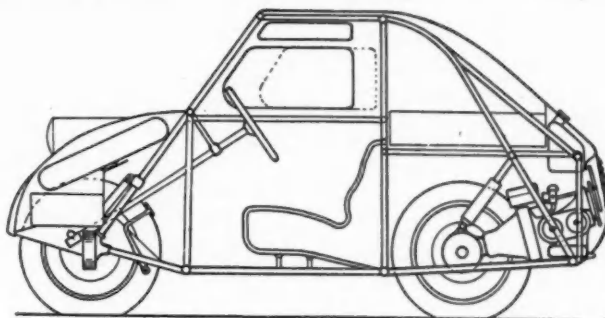
One of the designs submitted, the Frejour, shows a tubular steel frame with welded joints. This is the body frame, the car having no separate chassis frame. The four-cylinder air-cooled engine is located at the extreme rear and forms a unit with the transmission and final drive housings. In this design, too, the rear tread is narrower than the front tread.

Leon Laisne, who has figured among the radicals in French automobile engineering for quite a long time, is also represented in the competition. In his vehicle the two seats are arranged in tandem. The engine is located at the front end, and drive is through the rear wheels. The width of tread is 47 in. and the weight 928 lb. The tandem arrangement of seats has several things in its favor and seems to be acceptable to

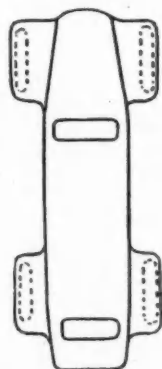
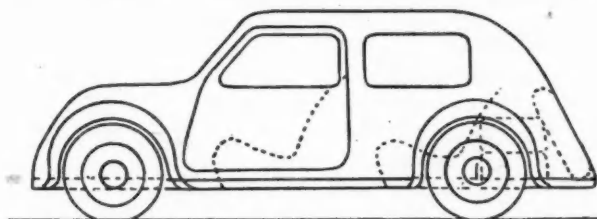
those going in for sports types. Whether it will appeal to many as an ordinary

passenger car remains to be seen. Even in private airplanes there is a tendency to place both passengers side by side, and in the automobile there are still more potent reasons for retaining the conventional seating arrangement.

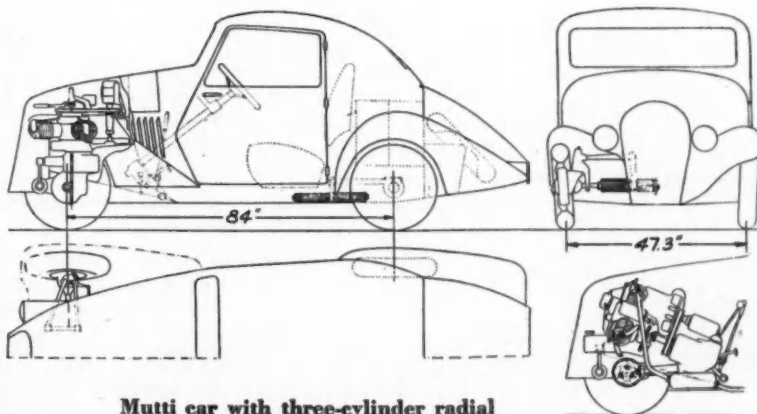
M. Andreau, a specialist in aerodynamics, has presented a three-wheeled design somewhat similar to that of Monge and Janin, whose design is reproduced herewith. This car has two front wheels which are merely carrier wheels, and a single rear wheel which serves as both steering and driving



Frejour car with a tubular body frame and without chassis



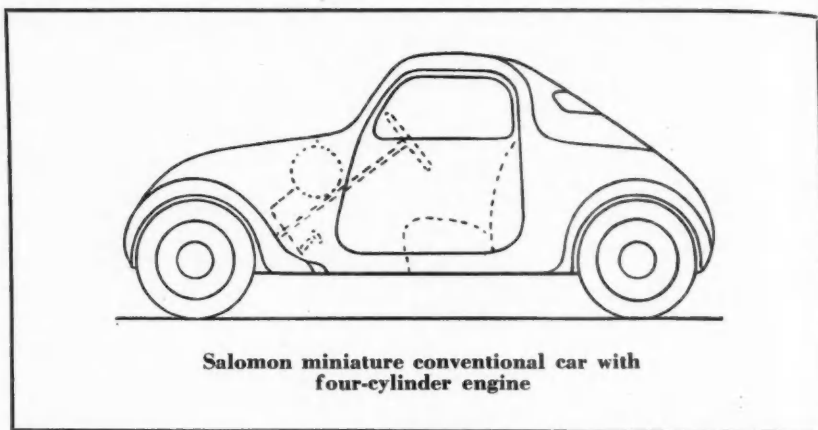
Leon Laisne car with tandem seats



Mutti car with three-cylinder radial engine

wheel. This permits of excellent streamlining. Thus the front wheels are completely enclosed. It seems, however, that the adherence of the rear wheel is hardly sufficient, considering that it is both a steering and a driving wheel, and that the center of pressure of the body is located well forward. The Andreau vehicle is to be equipped with an engine of automatically variable displacement, concerning the details of which the originator is somewhat vague. This type of engine is said to permit of dispensing with both the friction clutch and the change gear. But it is the high degree of streamlining that is the most characteristic feature of this vehicle. Owing to the excellent streamlining, the air resistance is said to be reduced by 84 per cent (presumably as compared with a flat plate of a surface equal to the forwardly projected area of the car). A light car of conventional design when traveling at 70 m.p.h. gives about 16.8 miles to the U. S. gallon. With the Andreau car it is said to be possible to reach 128 m.p.h. with a fuel mileage of 47.4 to the U. S. gallon. In a second project M. Andreau retained the conventional arrangement of parts, including four wheels, the front-mounted engine, front-wheel steering and rear-wheel drive. He has, however, adopted a highly streamlined type of body. The performance expected from this design is a speed of 87 m.p.h. with an engine of only 55 cu. in. displacement developing a maximum of 35 m.p.h.; and 50 m.p.h. with an engine developing only $8\frac{1}{2}$ hp.

The Monge & Janin car is provided with a four-cylinder horizontal opposed engine with a vertical crankshaft, the



Salomon miniature conventional car with four-cylinder engine

arrangement being similar to that of an outboard engine. Instead of the usual friction clutch it has an hydraulic coupling, and gear changes are obtained automatically by means of belts and pulleys. It is strange to find again in a 1935 design a type of transmission once popular on motorcycles, and there definitely abandoned. In this vehicle the door comprises part of the side wall of the body and part of the front, which renders access to the seats easy. Owing to the fine streamlining, the fuel consumption is expected to be reduced by 50 per cent. With a 20-hp. engine it is expected to attain a speed of 81 m.p.h. At a speed of 50 m.p.h. the fuel mileage is expected to be 59 per gallon. As a result of the special arrangement of the transmission and the mounting of the rear wheel, which can be swung through an angle of 90 deg., the car can be turned around a vertical axis through the center of its front axle.

The rear wheel can be swung even through 180 deg. and then serves to propel the car backward without the use of a special reversing gear. Could anything be simpler?

The design of M. Salomon is more in accordance with present-day practice. He provides for a four-cylinder engine located at the front, with drive to the rear wheels. The weight is estimated at 1170 lb. and the speed at 56 m.p.h. M. Salomon is of the opinion that about 30 per cent of the production of a machine of this type would be used for delivery purposes, and in his opinion a car with front drive or rear powerplant would not be well suited to commercial purposes. This is contrary to experience with the Phänomobil three-wheeled commercial car with front drive, which has been quite successful. M. Salomon thinks that front drive is more expensive to produce than rear drive, which is another thing against its use.

Hydrogen as an Auxiliary Fuel for Aircraft

IN the operation of airships it is necessary to compensate for the increase in lift due to the consumption of the fuel. This can be done either by "valving" some of the lifting medium, generally hydrogen, or by condensing the water vapor in the exhaust. The use of water-recovery apparatus results in an increase in weight, added drag and greater fuel consumption. In the case of propulsion by Diesel engines there would be considerable advantage in using the hydrogen that must be disposed of as fuel in the engine. It has been calculated that the amount of hydrogen required to lift one pound of fuel has a heat content equal to 0.215 lb. of the liquid fuel, so that if all of the hydrogen could be burned in the engine with the same efficiency as the

liquid fuel, the consumption of the latter would be reduced 17.6 per cent, and the payload could be increased correspondingly.

In order to study this problem, experiments were conducted for the National Advisory Committee for Aeronautics to determine the quantity of hydrogen that can be burned in the engine when inducted with the inlet air, the combustion characteristics of mixtures of hydrogen and fuel oil, and the suitability of exhaust gases for water recovery. The experiments are described in detail in N.A.C.A. Report No. 535, "Hydrogen as an Auxiliary Fuel in Compression-Ignition Engines," by Harold C. Gerrish and Hampton H. Foster. The conclusions arrived at from the results obtained are as follows:

It was impossible to auto-ignite hydrogen-air mixtures up to 12 per cent hydrogen at compression ratios of 13.4 and 15.6, although any quantity of fuel oil from 0.000007 to 0.00035 lb. per cycle would cause these mixtures to burn.

The engine could be stopped when burning the composite fuel by shutting off the fuel oil.

The maximum amount of hydrogen that could be burned satisfactorily decreased as the fuel-oil quantity and compression ratio increased, the maximum amount varying from 14 to 7 per cent by volume of the inducted air at a compression ratio of 13.4 and 12 to 5 per cent at a compression ratio of 15.6.

The brake thermal efficiency obtained with the composite fuel for all

engine outputs up to that required for cruising (constant-lift conditions) was as much as 9 per cent less than that obtained with fuel oil alone for the 13.4 compression ratio and 4 per cent for the 15.6. For higher loadings the thermal efficiency with the composite fuel was greater than that obtained with fuel oil; the increase was as much as 19 per cent for the 13.4 compression ratio and 13 per cent for the 15.6 compression ratio.

The burning of mixtures of hydrogen and fuel oil at compression ratios of 13.4 and 15.6 should be an efficient method of compensating for the decrease in weight of an airship due to the consumption of the fuel oil.

When the conditions within the combustion chamber were conducive to propagation of the flame through the hydrogen-air mixture, the composite fuel burned more efficiently than an equivalent amount of fuel oil, i. e., the hydrogen burned during the early part of the combustion period.

The exhaust gases were particularly suitable for water recovery. For all loads except idling the water vapor present in the exhaust weighed more than the fuel oil burned, approximately 25 per cent more for all loads above cruising. When burning the maximum usable amount of hydrogen along with the fuel oil, the weight of water vapor present was 80 per cent more at full load and 200 per cent more at small loads.

Distribution of Cylinder Wear

THE subject of distribution of cylinder wear, which has been discussed in these columns repeatedly, was referred to in a paper presented before the Central Transit Equipment Association at Chicago on Oct. 25 by H. L. Debbink, superintendent of gasoline vehicles of the Milwaukee Electric Railway and Light Company. Mr. Debbink measured up the cylinder bores of a considerable number of worn cylinder blocks. The results of these measurements led him to the conclusion that where the design and production of the blocks are perfect, the greatest wear takes place across the block, and on the maximum-thrust side, but in commercial engines imperfections in design and manufacture often result in variations from this rule. The factors which are most frequently the cause of these variations are as follows:

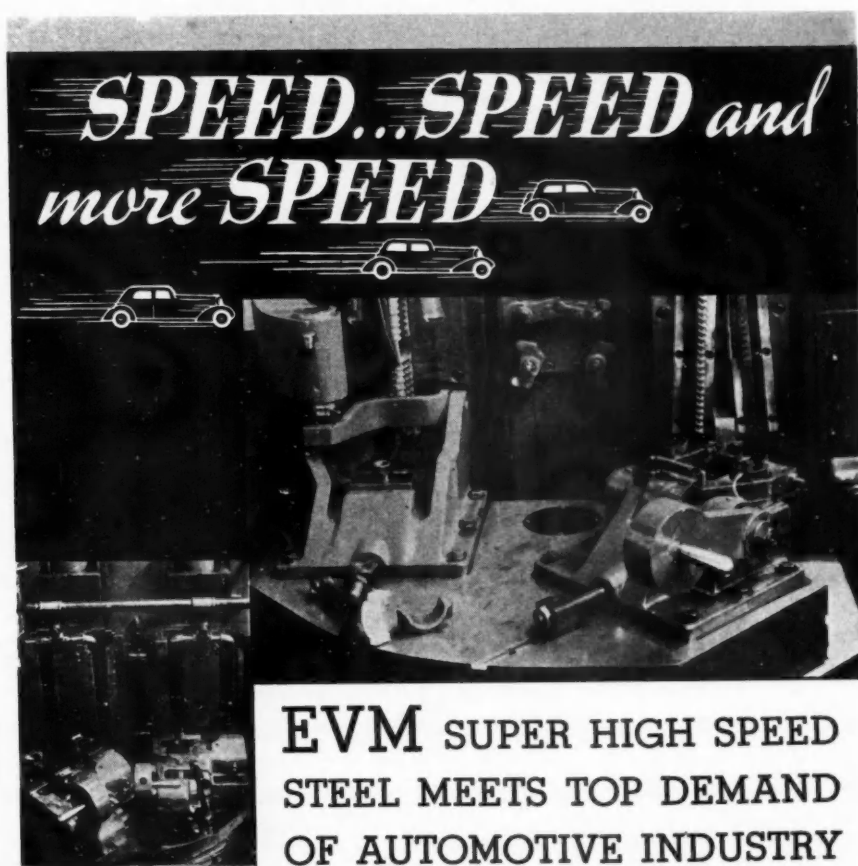
1. Unequal temperatures in the cylinder block, usually due to the method of introducing and distributing the cooling water; and,
2. Insufficient accuracy of cylinder

block with respect to either perpendicularity or straightness.

Mr. Debbink used eight photographs of worn cylinder blocks to illustrate his conclusions. He said these illustrations showed that as a rule the maximum wear is on the cooler side, where the cooling water is introduced, and where, in consequence, the cylinder wall cannot expand away from the piston so rapidly. The results also indicated that non-uniform heating of the cylinder wall has more influence on wear distribution than piston thrust. This, Mr. Debbink observed, ties in very nicely

with the corrosion theory.

Some blocks showed the wear to be greater in the longitudinal than in the transverse direction. This, Mr. Debbink said, was due to the cylinder bore not being absolutely perpendicular to the crankshaft axis. In that case, the pistons in their up and down motion try to correct this defect, thus causing greater wear in the longitudinal direction. Rapid wear in the longitudinal direction has been observed particularly in the forward cylinders of blocks in which the water pump is mounted in the forward end.



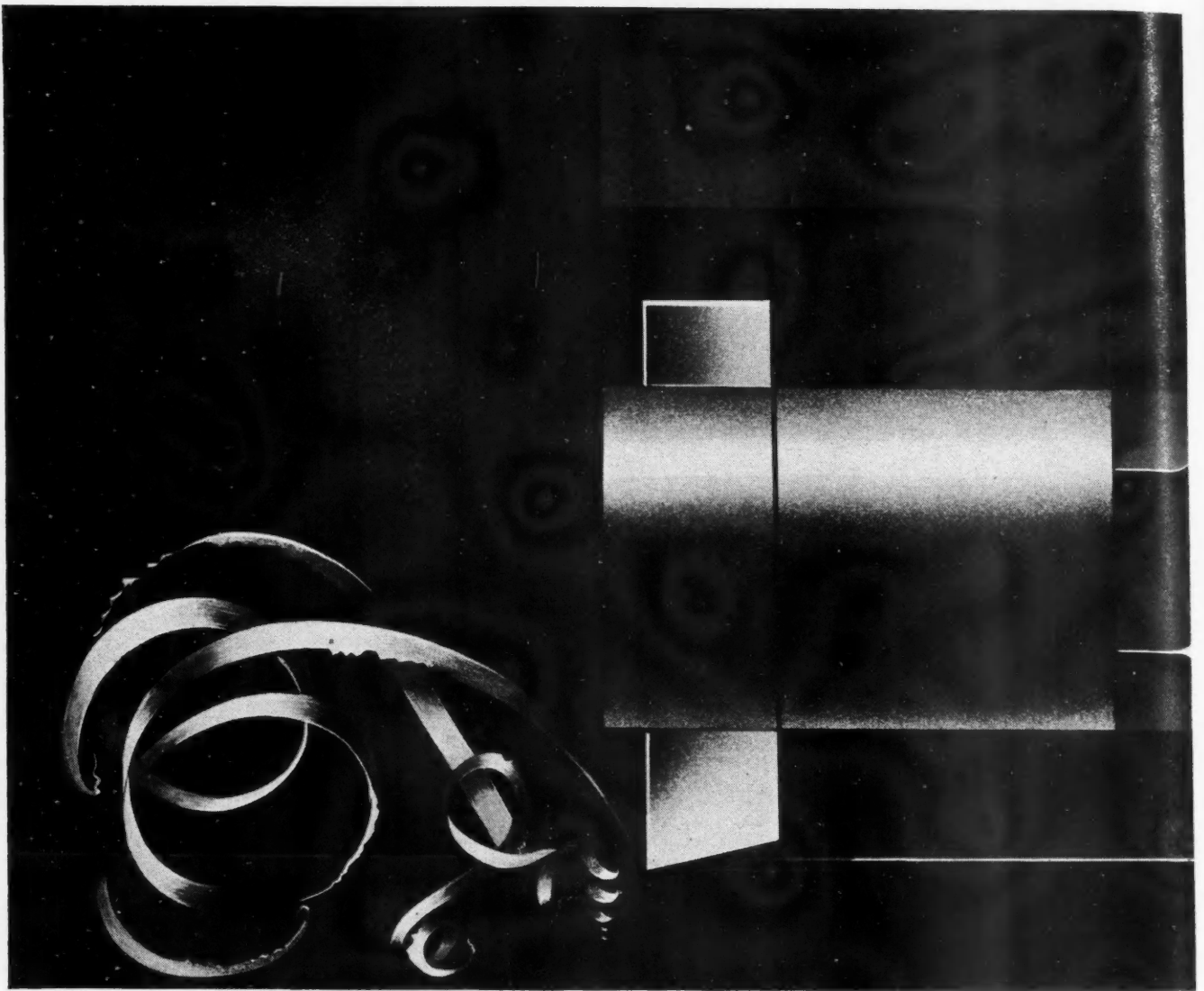
SPEED...SPEED and more SPEED

EVM SUPER HIGH SPEED STEEL MEETS TOP DEMAND OF AUTOMOTIVE INDUSTRY

In this particular broaching operation, the installation of a large battery of the latest broaching machines would have been out of the question without a tool steel suitable for broaches that would meet the production demands.

E. V. M. is a super grade high speed for just such operations. In fact, it shows noticeably increased wearing ability and marked superiority for such uses as drills, chasers, lathe tools, forming tools, etc.

VANADIUM-ALLOYS STEEL COMPANY
PITTSBURGH, PA.



MOLY pares machining costs

MACHINE SHOP cost sheets often contain an accumulation of items that are avoidable. Some are caused by hold-overs from other processes — rolled-in scale — non-uniform hardness — distorted parts — meaning excessive tool, labor and material costs.

They are avoidable by standardizing on Molybdenum steels. Forgings are less likely to be scaly, seamed, or temper brittle. Carburized parts are less apt to be inconsistently distorted. High cutting speeds are safer and close tolerances more easily maintained. Time, power, labor, tool and material costs can be greatly reduced.

One maker of tool joints for oil-well service — a

high-volume precision job — reports a 10% saving in over-all machine costs by standardizing on Chrome Moly steel (SAE 4140).

Your particular case may not be exactly similar, but — the savings in production costs effected by Moly steels and irons are not confined to the machine shop. So, it will pay you to investigate Moly in connection with your own problems. Our laboratory facilities are available if you are interested. Meantime our helpful technical book, "Molybdenum," is yours for the asking — as is also our periodically published news-sheet, "The Moly Matrix." Climax Molybdenum Company, 500 Fifth Avenue, New York.

CUTS COSTS **CLIMAX Mo-lyb-den-um** **CREATES SALES**